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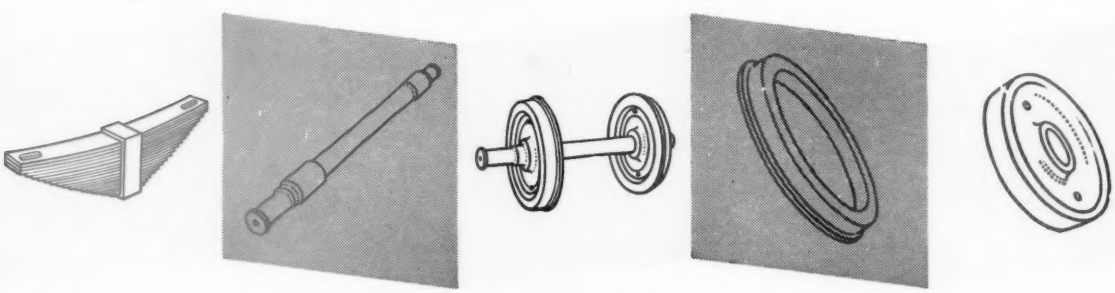

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Diesel Locomotive Designs for British Railways

THE three types of diesel locomotives so far delivered to British Railways under the modernisation plan, all with different power characteristics, are intended for freight and mixed-traffic duties. The British Thomson-Houston locomotive handed over earlier this week is an 800-h.p. Bo-Bo, the A1A-A1A diesel-electric locomotive delivered by Brush Traction Limited on October 31 is of 1,250 h.p., and the English Electric Co. Ltd.-Vulcan Foundry Limited Bo-Bo mixed-traffic locomotives, the first of which was taken over by British Railways on June 3, are of 1,000 h.p. Two of these types of locomotives—the English Electric-Vulcan and the B.T.H., are of bonnet type, but the larger Brush locomotives have full-fronted cabs at both ends. Another notable feature of the Brush locomotive is the basing of its design on that of a batch of 5-ft. 6-in. gauge locomotives of similar power and wheel arrangement supplied to the Ceylon Government Railways nearly five years ago. The A1A-A1A wheel arrangement is new to this country. Useful as these smaller locomotives will be, the greatest interest is bound to centre on the larger locomotives in the 2,000-h.p. class, the first of which should soon be running trials. The White Paper on proposals for the railways, issued in October, 1956, declared that the first fleet of main-line diesel locomotives is to "be put into intensive operation, under careful observation, and is intended to be the subject of a thorough and selective trial." This might be taken to imply that the main bulk orders will not be given for some considerable time, but the White Paper promised that essential data "will be obtained in the shortest possible time." Nevertheless, the need to achieve higher efficiency quickly may well persuade the British Transport Commission to follow the example of the airline corporations and order locomotives almost off the drawing-board. Great interest will attach to the performance of the units fitted with Voith hydraulic transmission being built by the North British Locomotive Co. Ltd. and also those with Mekydro transmission being built at Swindon; the first of the latter should soon be ready for service. Although hydraulic transmission is in use in some British Railways railcars running in the West Riding and in a few small shunters, no main-line diesel-hydraulic locomotive is as yet running on British Railways.

East African Railways Motive Power Policy

THREE years ago there was much talk of extensive electrification of the Kenya-Uganda main line of East African Railways & Harbours, using current generated at Owen Falls, amongst other sources. A more conservative policy, necessitated in part, no doubt, by the financial stringency apparent from the revised estimates mentioned on page 584, is being pursued by the East African Transport Advisory Council. This has accepted the main conclusions of a report on electrification policy. Diesel locomotives, it was recommended, should be purchased for use in the first place on the Nairobi-Nakuru section; but before a final decision is taken on whether diesel or electric locomotives are more suitable for the most heavily worked sections of the railway, a further review is to be made in about five years. The Council agreed that 10 large diesel locomotives each of about 2,000 h.p., and associated equipment, should be ordered as soon as further loan funds become available. It was also agreed to confirm the previous recommendation for the purchase of 10 medium-size diesels (1,000-1,400 h.p.) to replace obsolete steam locomotives.

Increasing Transport Productivity

A REMINDER of the part that can be played by British Railways in the struggle against inflation was given last week by Mr. Harold Watkinson, Minister of Transport & Civil Aviation; he was the guest of honour at the annual dinner at the Connaught Rooms, London, W.C.2, of the Public Transport Association. Inflation, he pointed out, could be avoided largely by increasing productivity, and in the case of the nationalised transport undertakings, which provided a service, a measure of increased productivity was reduced costs and higher output of the staff. The justification for investment of £170,000,000 in each of the next two years on modernisation of the railways and other State-owned transport was the increased efficiency and reduced costs which would result. He added that enhanced efficiency would result in increased prosperity for railwaymen; the Chairman of the British Transport Commission, Sir Brian Robertson, was trying through the modernisation scheme to make the railwayman's job the key job in industry.

Eastern Region Traffic Organisation

THE Eastern Region of British Railways has brought its new traffic organisation into operation in two phases; in this respect it differs from the London Midland and the North Eastern Regions, which have been introducing theirs gradually—as appointments to the traffic officer posts have been filled, responsibilities have been gradually devolved on them. Of the three "lines," formed for the purpose of co-ordinating all traffic activities in the Eastern Region, the L.T.S. Line, with Mr. J. W. Dedman at Line Traffic Manager, started to function a year ago; but the Line Traffic Managers of the Great Northern and Great Eastern Lines, Mr. G. F. Fiennes and Mr. W. G. Thorpe,

assumed their posts at Great Northern House, Euston Road (near Kings Cross) and at Hamilton House, Bishopsgate (adjoining Liverpool Street) respectively, last Monday. The new organisation has much to commend it from the point of view of winning and dealing with freight and passenger traffic. It remains to be seen how far it will justify the disturbance caused by such far-reaching reorganisation; details of the latter already have been published in our columns.

Railway and Road Relationships in the U.S.A.

THE relationships between the 132 major railways in the U.S.A. and road hauliers were discussed by Mr. G. W. Quick Smith, Member of the Board of Management of British Road Services, in a paper read to the Yorkshire Section of the Institute of Transport last week. Mr. Quick Smith has recently spent six weeks in North America visiting road haulage undertakings in the principal cities. Competition between rail and road, he states, is "intense, and fear and suspicion between them is even greater than in this country." Despite the distances involved, road services can often give better transit times than rail where rail services involve marshalling. There is some co-operative working, however, notably under the "piggy-back" system, involving the carriage of road trailers on trains of special flat wagons. One regular service runs daily between New York and Chicago, a trunk distance of 600 miles. Experiments are being carried out with a van fitted with alternate sets of wheels for rail and road but he considers that it has yet to be proved whether this gives any advantage over the container system as used in Britain.

Overseas Railway Traffics

RAILWAY revenues of the Canadian Pacific for September were $39,345,607 (against $42,498,187 for September, 1956) and railway expenses $36,252,081 ($38,278,605) so that net earnings were $3,093,526 ($4,219,582). Aggregate net earnings from January 1, were $24,658,046 ($28,001,212). Paraguay Central Railway receipts continue to decline in comparison with the 1956 equivalents, and at October 25, the aggregate receipts from July 1, were G32,813,502. This was G2,096,711 less than in the corresponding period of 1956. Receipts for the week ended October 25, were G1,913,287, a decrease of G130,573 on the corresponding week of 1956. Costa Rica Railway receipts for September were colones 1,631,245 compared with colones 1,289,866 for September, 1956, an increase of colones 341,379. Aggregate receipts from July 1, amounted to colones 5,415,897 (colones 4,815,081). At September 30, the official exchange rate was colones 15·87 to the £. Figures received from the Midland Railway Company of Western Australia Limited show that estimated road and railway receipts for August were £A73,532 (against £A92,757 for August, 1956). Aggregate receipts for the two months July-August were £A141,594 (against £A168,894 in 1956).

An Underground for Bombay?

HIGH traffic density on Bombay Island, the availability of electric power at low rates, an easy terrain, and a comparatively low rate of interest on the capital are factors in favour of building an underground electric line in Bombay. The project is the subject of a report by Mr. Y. Higashi, Director-General of the Teito Rapid Transit Authority in Tokyo, and is now being considered by the Bombay Electric Supply & Transit Undertaking. Briefly, it provides for construction by cut-and-cover in two stages of a line in a figure of eight, serving the Central and Churchgate stations of the Western Railway, intersecting by the Victoria Terminus of the Central Railway, and with its southernmost point near the Museum, in the south of the island. Provision is also made for a six-mile extension northwards to Sion, near the strait separating the island from the mainland. The line will ease street congestion by conveying passengers from and to the main-line railway stations. There have been several proposals for underground railways in Bombay and Calcutta; but the traffic congestion in the former city and the favourable circumstances mentioned in the report seem likely to make Bombay the first city in India to be served by such a line.

Automation in Transport

IN a controversial paper read to the Institute of Transport last Monday, Sir Walter Puckey, Chairman of Automation Consultants & Associates Limited, drew attention to the disproportionate care given to the reduction of time spent moving in railway and other transport vehicles on a journey compared with that given to the reduction of the overall journey time. The faster travel becomes, he points out, the more important, relatively, become "the preliminaries and the conclusions." As he remarked, British Railways are interested in the application of automation to ticket reservation systems, but progress is slow at present. As to freight traffic, he quoted a comparison of delivery costs to consumers prepared by a factory. This purports to show that, taking rail costs as 100 per cent, outside road services cost 60 per cent, and the factory's own transport only 36 per cent. This analysis was, rightly, hotly contested in the discussion which followed the paper, and is almost certainly either an isolated case for geographical reasons or one in which all the circumstances are not the same and like is not being compared with like.

Diversionary Routes for Freight Traffic

ONE of the most useful results of the nationalisation of railways in Britain was the potential freedom to use the shortest suitable route between any two points, irrespective of the former company ownership. The new marshalling yard to be built at Swanbourne, in Buckinghamshire, will be served by routes which take full advantage of this freedom. It is to be fed by the cross-country Cambridge-Oxford line, which is to be improved in capacity and provided with better connections to the main-line radial routes which it crosses. When in full operation, it will be possible to divert 30 trains each way daily to this route, including many of the 10,000 wagons a day which now pass through the steeply-graded, narrow-tunnelled cross-London lines. The Cambridge-Oxford route connects with the Great Eastern Line of the Eastern Region at Cambridge, crosses the East Coast main line at Sandy and the St. Pancras-Derby line of the London Midland Region at Bedford, crosses the Euston-Crewe line by level junction at Bletchley, connects with and passes under the Marylebone-Sheffield line near Calvert, and connects with Western Region routes at Oxford. These last also give connections to the Southern Region. One of the most important improvements is a flyover at Bletchley, but new junctions, chord lines, better signalling, and so on, will be features of the whole route.

Passenger Surveys

THE practice of asking passengers to fill in questionnaires on various aspects of railway travel is by no means new, but the scale on which it was done in the Eastern, North Eastern, and Scottish Regions in September was almost certainly unprecedented. Special staff travelled in trains on the East Coast route, issuing and collecting forms on which passengers were asked to give brief particulars of their journeys and the extent to which existing services met their needs. The presence of special staff was a shrewd touch which probably resulted in many more replies being received than would have been the case had the forms been left on the seats and collected by station or train staff at the end of the journey. No fewer than 228,000 separate answers to specific questions were given by 19,000 passengers, and the Regions are now analysing the replies. The information will be used in modelling future Anglo-Scottish and other services on the route. The same method was used last week on the West Coast route by a joint team from the London Midland and the Scottish Regions, which covered the

principal day express services between Euston and Scotland. Operating conditions do not always allow train services to be fitted exactly to the needs of passengers, but the principle of finding out what the customer wants —the application of market research to railway passenger travel—has everything to commend it.

Main-line Freight Diesels for L.M. Region

THE 800-h.p. Type "1" B.T.H. diesel-electric locomotive, handed over to the London Midland Region on Monday, as reported elsewhere in this issue, is the first of the batch of 10 such units to be delivered. This design was one of the 141 diesel locomotives ordered in the autumn of 1955 by British Railways and is the first of this power category to be completed. Intended for main-line freight duties, the units will be allocated to Devons Road Motive Power Depot, Bow, where they will join the 1,000-h.p. English Electric diesel-electric units, described in our issue of June 7, for working freight trains between Poplar, Temple Mills, Acton and Willesden. In general design, the new units are similar to the 800-h.p. Bo-Bo diesel-electric locomotive built in 1950; this had diesel and electrical equipment by the same manufacturers, Davey Paxman and B.T.H., and could be thought of as the prototype of the new units. As is to be expected, lessons which have been obtained from practical operating experience on British Railways, have been incorporated where applicable. The locomotive is the subject of an article on another page.

Cables at Euston

LORD RUSHOLME reminded his listeners of the historic connections which the site of the handing over ceremony had in railway engineering, by referring to the fact that the platform was part of the original Euston Station, designed by Robert Stephenson, and built in 1837. When first opened, trains were hauled out of the station by endless cables, operated by stationary winding engines at Camden. Within a few years, he pointed out, the wheel of history would have turned a full circle, and cables would again be installed at Euston; but they would be cables of a very different order, conducting high-voltage alternating current from the national grid for the electrification of the main-line from London to the North. He added that until electrification was completed diesel trains and locomotives will bring the immediate benefits of this form of power to provide cleaner, quicker, and more efficient and reliable services; these will become increasingly apparent as the British Railways programmes come to fruition. As far as diesel-electric locomotives are concerned, new designs will appear on British Railways within the next few months; these are believed to include, among others, examples from North British and English Electric.

Railway Wages Policy

NEITHER last week's debate on the Opposition amendment to the Address, nor the further replies by the Minister of Transport, Mr. Harold Watkinson, to Parliamentary questions, has clarified the confusion over the finances of the British Transport Commission, the railwaymen's wage claim, and the Government's relation thereto. The Government is itself responsible for this complexity, because it gratuitously stated that it would not finance an "inflationary" wage claim on the part of the railwaymen. Up to then the idea had occurred to nobody, so it is comprehensible why it was interpreted as implying possible interference with the normal process of collective bargaining and arbitration.

Although, later, the Prime Minister attempted to water down the statement by the Minister of Labour, Mr. Iain Macleod, he did not help to clarify the position. It was left to the Paymaster-General to do so, in reply to Mr. Gaitskell, Leader of the Opposition, who moved the amendment; Mr. Maudlin stated that the Government could "not increase the amount of money flowing from the taxpayer to meet the railways' operating deficit," and added that if the Commission wages bill rose it would have to meet the cost from its own resources. That is clear enough, but it has been the position all along. It has been suggested neither in Parliament nor by the unions that greater assistance would or should be forthcoming from the Government additional to the £250 million made available over the 1956-62 period by the Transport (Railway Finances) Act passed early this year.

It is unfortunate that the Government cannot keep its hands off the Commission, for it burns them every time it touches it. If it had been able on more than one occasion to resist the temptation to interfere with matters which should have been left to the Commission as the employer of the labour concerned, much trouble would have been avoided. The railwaymen's claim this autumn was made in the normal way and would no doubt have been dealt with through the usual channels of negotiation and, if necessary, by arbitration. The process might well have been protracted because of the known reluctance of the unions, in the probable absence of public sympathy and their depleted funds, to press their claims too far too speedily. By its statements the Government has sown suspicion of its intention to interfere with this normal course of negotiation; this suspicion is strengthened by the unfortunate history of past interference by both Conservative and Labour Governments. Mr. Aneurin Bevan, when Minister of Labour, was the first to intervene. Early in 1951 he in effect forced the Commission to meet the railwaymen's claim.

A second intervention came from the Conservative Government in January, 1955, when after the Court of Inquiry had reported it again intervened and the Chairman of the Commission, Sir Brian Robertson, was reported as saying that where the money was to come from was no concern of his. This was interpreted to mean that the Government had given an undertaking to assist the Commission financially which, at that time, it failed to do. There was reason behind this interpretation because the Court of Inquiry in its interim report had stated:—"The nation has provided by statute that there shall be a nationalised system of railway transport which must be regarded as a public utility of the first importance. Having willed the end, the nation must will the means. This implies that employees should receive a fair and adequate wage, and that, in broad terms, the railwaymen should be in no worse case than their colleagues in a comparable industry." It further concluded that the statutory requirement that the Commission must pay its way, taking one year with another, should not be allowed to stand in the way of legitimate wage claims. It added the proviso, however, that it should be able to see its way ultimately to make ends meet. These findings were accepted by the Government.

The position is not strictly comparable today. First, because the railwaymen are probably in no worse case than employees in comparable jobs in other industries, and, second, because the Government has already willed the means, up to a point. It is uncertain, however, whether the Commission, despite the Minister's reiteration in reply to further Parliamentary questions that the estimates of the White Papers can still be fulfilled, can put its hand on its heart and testify with all honesty that it can see the day when its accounts will be in balance. It might have been able to do so but for two things: first, the slowing down of the investment programme on which the Commission relied for the increased traffics necessary to improve its position; and, second, the changed position in regard to wage claims, which has resulted from the unfortunate selection of the British Transport Commission by the Government to demonstrate its wages policy, and from the Minister of Labour's unhappy choice of words. If the Government intention was to strengthen the hands of the Commission in resisting wage demands, in the event it may be found to have done the reverse. It may have prevented a straightforward claim being dealt with in an atmosphere free from suspicion so essential to a fair settlement. It would have done better to leave well alone.

Reduced Revenues in East Africa

THE effect of world events over the past on the economy of the three territories, Kenya, Uganda, and Tanganyika, served by East African Railways & Harbours is shown in the draft estimates of revenue and expenditure for 1958 and 1957 (revised), a copy of which has reached us from the E.A.R. & H. administration in Nairobi. The estimates bear the signature of Mr. W. Urquhart, Deputy General Manager, who was Acting General Manager pending the arrival of Mr. J. R. Farquharson, who assumed his duties as General Manager last month.

The dull trading conditions which prevailed during the greater part of 1956 have continued into 1957, and the earnings of the railway services for the current year (including the rates increases introduced on October 1 last) are not expected to exceed those for 1956 by any appreciable margin. While third class passenger traffic has shown a welcome expansion—presumably because of the increased spending power of the African—there has been a slight decrease in comparative freight revenues. Much of this is ascribed by the management of E.A.R. & H. to the falling off, both in tonnage and in earnings, on the Central Line in Tanganyika, as the result of the closure of the Suez Canal late in 1956. This caused import traffic to the Belgian Congo, which previously had passed through Dar es Salaam and been conveyed thence to Kigoma and across Lake Tanganyika to Albertville, to be diverted to Matadi; and it still continues to pass by the West Coast route to the Congo.

The rates increases forecast last year were eventually approved for introduction on October 1, 1957, and are estimated to bring in an additional revenue of some £1½ million in a full year, a figure which, with the increasing burden of rising costs and higher loan charges, will not permit any special contributions to be made towards reducing the shortfall in the renewals fund nor allow any appreciable amount to be set aside for betterment. The latter, it is stated, with the difficulties of obtaining capital on the London market, has necessitated considerable curtailment of the development schemes for the next three years, which now provide only for those improvements which will enable the railways and harbours to continue to operate, without any allowance for additional facilities other than those required to cope with a very small increase in traffic. Agricultural progress continues in all three territories and, if these products are to be marketed, development of the railway and harbours must not lag behind. Any increase in the tempo of the development of the East African territories or the introduction of new industries, may find the E.A.R. & H. administration short of transport capacity with all the difficulties and dangers which experience has shown can result from such a situation.

Special economy measures were introduced early in 1957 immediately it became evident that the revenue estimate of £18,600,000 was unlikely to be realised, and, in consequence, it has been possible to reduce the original estimate of working expenditure by £351,000, part of which, however, is non-recurrent. The fall in revenue has not been accompanied by a corresponding reduction in tonnages carried, and the railway has had to maintain services on much the same scale as in previous years when higher revenues were earned. The result is that the net revenue account for 1957 shows a loss of £443,169, which is chargeable to the rates stabilisation and relief reserve. The estimated net deficit carried forward to 1958 is £272,135.

As to expectations for 1958, the management considers it reasonable to budget for a 4 per cent revenue increase over the disappointing results of 1957, and earnings, allowing for a complete year's rates increases, are placed at £19½ million, of which roughly £800,000 is expected from additional traffic. Working expenditure shows an increase of £619,450 over the 1957 revised estimates, due mainly to rising costs (the increased price of fuel alone amounts to over £175,000), and provision for increased mileage to cater for the additional traffic. After providing for increases in interest and loan redemption charges, amounting to £517,150, the balance carried to the appropriation account is £260,521 against the estimated deficit of £272,135 brought forward from 1957.

While the indications are that any substantial increase in railways and harbours traffic is unlikely in the immediate forseeable future, rising costs of materials and labour will continue to have a depressing effect on net revenue. This position can only be met by further economies and by additional revenue. The economy measures already taken are approaching the maximum compatible with safety and without undermining the structure of the Railways & Harbours Administration. It is pointed out in draft estimates that "it would be a shortsighted policy to reduce services which, while achieving an immediate economy, would be difficult and costly to reintroduce in more prosperous times." Additional revenue can result only from additional traffic or by an increase in rates.

British Transport Commission Traffic Receipts

THE passenger receipts of British Railways for Period 11, the four weeks ended November 3, are in accordance with the seasonal trend, somewhat lower, at £9,059,000, than for the preceding period (£9,915,000). The increase of £521,000 over the corresponding period of last year is very largely the result of the fares increases in mid-September. In view of this, it is perhaps disappointing that the excess over last year was not more, in view of the inauguration in the past 12 months of diesel services and of the extension of reduced fare facilities, which might have been expected to result in higher revenue.

—	Four weeks to November 3		Incr. or decr.	Aggregate for 44 weeks		Incr. or decr.
	1957	1956		1957	1956	
	£000	£000	£000	£000	£000	£000
Passengers—						
British Railways ..	9,059	8,538	+ 521	120,590	108,852	+ 11,738
London Transport Railways ..	1,785	1,806	— 21	19,439	18,549	+ 890
Road services ..	4,506	4,391	+ 115	50,366	46,970	+ 3,396
Provincial & Scottish buses ..	4,165	4,134	+ 31	49,238	48,589	+ 649
Ships	246	250	— 4	6,401	5,883	+ 518
Total Passengers ..	19,761	19,119	+ 642	246,034	228,843	+ 17,191
Freight, Parcels & Mails—						
British Railways:						
Merchandise & livestock ..	8,672	8,642	+ 30	91,308	87,741	+ 3,567
Minerals ..	4,421	4,349	+ 72	44,986	43,631	+ 1,355
Coal & coke ..	10,812	10,263	+ 549	106,517	105,640	+ 877
Parcels, etc., by passenger train	4,195	3,821	+ 374	42,894	39,896	+ 2,998
Collection & delivery, etc. ..	1,037	1,036	+ 1	11,375	10,827	+ 548
Total Freight British Railways	29,137	28,111	+ 1,026	297,080	287,735	+ 9,345
Others*	4,481	4,509	— 28	46,839	47,266	— 427
Total Freight, Parcels & Mails	33,618	32,620	+ 998	343,919	335,001	+ 8,918
Total	53,379	51,739	+ 1,640	589,953	563,844	+ 26,109

* Inland waterways freight, road haulage, and ships.

British Railways merchandise and livestock receipts at £8,672,000 are an improvement on Period 10 (£8,310,000), and exceed last year's figure by £30,000. It is to be hoped that this is the start of an increase in these categories of revenue. Coal class traffic receipts at £10,812,000 are encouraging, and compare with £10,263,000 for this period of 1956, and with £9,668,000 for the preceding four weeks.

The total freight, mineral, parcels, and mails receipts of the British Transport Commission for Period 11, however, are only slightly (£998,000) in excess of the total for the corresponding four weeks of 1956. The aggregate traffic receipts, both passenger and freight, of the Commission for the first 44 weeks of the current year at £589,953,000 exceed last year's figure by £26,109,000.

They must improve if the Commission is to receive the required balance by 1961 or 1962. This may well prove possible, if British Railways receipts improve.

PERCENTAGE VARIATION 1957 COMPARED WITH 1956

	Four weeks to November 3	44 weeks to November 3
British Railways—		
Passengers	+ 6·1	+ 10·7
Parcels	+ 9·7	+ 7·5
Merchandise & livestock	+ 0·3	+ 4·0
Minerals	+ 1·6	+ 3·1
Coal & coke	+ 5·3	+ 0·8
C. & D. services	—	+ 5·0
Total	+ 4·2	+ 5·3
Ships (passengers)	— 1·6	+ 8·8
British Road Services, Inland Waterways, and Ships (cargo)	— 0·6	— 0·9
Road Passenger Services, Provincial & Scottish	+ 0·7	+ 1·3
London Transport—		
Railways	— 1·1	+ 4·7
Road services	+ 2·6	+ 7·2
Total	+ 1·5	+ 6·5
Aggregate	+ 3·1	+ 4·6

Improving Riding of Passenger Vehicles

IN the present stage of development of improvements to bogies, special interest attaches to the paper, "Vibrational Aspects of Bogie Design," given last Wednesday to the Institution of Locomotive Engineers by Mr. J. L. Koffman. A dispassionate evaluation of riding qualities relating frequencies and amplitudes of oscillations to passenger fatigue, he states, was in the past, hindered by the absence of data; and there have been many controversies, for example, about the riding merits of heavy versus light vehicles. Agreement is general that many vehicles ride well up to speeds of around 50 m.p.h. and that the performance becomes less satisfactory at higher speeds; with the forthcoming large-scale introduction of diesel and electric locomotives, mostly of Bo-Bo and Co-Co designs, in this country, the subject has become more pertinent, and the paper is in the nature of a continuation of an earlier paper given by the author to the same Institution in 1948. He proceeds to analyse the five fundamental modes of vehicle body vibration which are of particular interest to bogie designers. These are: lateral oscillations; rolling and swaying oscillations; body nosing; fore and aft oscillations; and vertical oscillations.

Lateral oscillations, he points out, are induced by individual wheel sets running along a sinusoidal course which is induced principally by the tyre coning, speed, and wheel diameter; the greater the taper of the tyre, for example, the smaller the wavelength and thus the increase of frequency of oscillation. Having determined the approximate magnitudes of forcing frequencies and amplitudes as a function of vehicle speed, and so on, the next problem is to establish design parameters likely to keep unpleasant oscillations away from the vehicle body at least at the operational speeds. This means that unpleasant resonance oscillations should be confined to lower speeds as usually encountered whilst accelerating or slowing down. With bogies the relevant considerations are to a certain extent determined by the action of the swing links.

The restoring action of vertical and inclined swing links is discussed, and it is pointed out that it is possible to dispense with these items by alternative spring devices. Mr. Koffman believes that preference should be given to long vertical links in conjunction with auxiliary restoring devices such as rubber cone bumpers, or similar devices, widely used as auxiliaries with road vehicle suspensions. The lateral impact between rail and wheel flange also receives attention; the relative importance of the wheelbase, the moment of inertia, the flange to rail clearance are indicated. To reduce the damaging effects, he maintains that wheel diameters should be increased, and the moment of inertia about the vertical axis decreased.

In this connection, he points out that the French and Swiss railways have introduced lateral spring devices between the axleboxes and frames of their most recent Co-Co electric locomotives. The moment of inertia is minimised by keeping the wheels small and concentrating the heavy masses as close to the centre pin as possible. A further improvement to the problem, he adds, will be achieved by using inside frames. The beneficial effect of damping should not be neglected as far as bogie hunting is concerned. A certain amount of damping can be provided by supporting the vehicle body at or near the extreme end of the bolster over the springs; this practice, he points out, has been adopted with many recent designs, particularly as it also permits weight reduction by virtue of direct load transmission. He states that experience suggests that the possibly slightly increased flange wear on curves is more than compensated by reduced wear on the straight resulting from damping the hunting action.

Rolling and swaying oscillations are caused by the lateral motion of the bogie, which results in a body motion composed of a lateral displacement on the swing links paired with a roll caused by bolster spring deflection. The combined action of the lateral displacement and rolling causes the body to move as if it were swaying about a point, which with empty carriages is frequently located near the rail level. He shows that the distance between the springs can be increased, and the angle of roll reduced, without increasing the vertical spring rate. With most modern types of bogie this has been achieved by placing the bolster springs in line with the frame members.

Because swaying oscillations are induced by the sinusoidal motion of the wheels and the resultant bogie hunting, besides body nosing, the aim should be to avoid resonance at operating speeds.

Body nosing is the term usually applied to the oscillation of carriage or locomotive bodies about a vertical axis through the centre of gravity. This can become somewhat violent with worn tyres when the forcing frequency might come into resonance with the natural frequency of the body and swing links or restoring spring system. Here, too, the designer should aim at preventing resonance at the operating speed range, always bearing in mind the range of forcing frequencies originating at the wheels when new, as well as with worn tyres.

The occurrence of fore and aft oscillations, sometimes encountered with carriages, can usually be traced to two sources—bogie pitching or unbalanced wheels. The pitching oscillations of the bogie frame on the primary suspension springs are excited by the passage over the rail joints, the pitching taking place about a point between centre of gravity and axle level. As the oscillations are mainly transmitted via the centre pin it will be desirable to locate this in line with the point about which the pitching takes place, and/or to dispense with conventional bolster check plates since these transmit the pitching from the frame to the bolster. To avoid the fore and aft oscillations to the body, it will be advisable to link the bolster by suitably long links to the frame, or preferably to the axlebox or to the swan-neck beams of Pennsylvania-type bogies; this permits the bogie to pitch without forcing the bolster to carry out fore and aft oscillations. However, with high-power electric locomotives, the position of the centre pin affects weight transfer, and consequently the maximum tractive effort of the leading wheels; thus requiring careful consideration due to the over-riding traction requirements. The importance of the accuracy of wheel balance is stressed; even if a wheel is only $\frac{1}{64}$ in. out of centre, the centrifugal force due to this at 85 m.p.h. for a $\frac{1}{2}$-ton wheel is some 115 lb.

On the question of vertical oscillations, he states that tests on representative vehicles have shown that oscillations of the bolster springs are far less severely damped than on primary and, because of this, the overall natural frequency is, in the main, determined by the natural frequency of the bolster springs.

As it is generally desirable to ensure a low natural frequency of pitching and bouncing, and because the overall static spring deflection under tare load can scarcely exceed about 6 in., he advocates allocating a large propor-

tion of this to the bolster springs, and aiming at a damping factor of 0·2 to 0·25.

With the electric or diesel locomotives the bogies are usually placed much closer together than with coaches, and because of this, the frequency of excitation is increased; this combined with the effect of the heavy sprung portion of the bogie results with some designs in the lower, as well as the higher, resonance frequencies being encountered in the operating range of locomotive speeds, particularly as far as pitching is concerned. Whilst with carriages the sprung part of the bogies claims between 10 and 17 per cent of the total weight, with locomotives this amounts to 30 to 35 per cent, whilst the spring deflection of the primary suspension usually claims about 50-60 per cent of the total. With power bogies the damping will also depend on the tractive effort since this will affect the friction forces at axle guides and centre pin. The use of fully-sprung motors with electric locomotives makes it necessary to consider the effect of the quill drive on the spring rate of the primary suspension. Some quill drives appreciably increase the stiffness of the bogie to axles system; and this must be taken into account.

The author of the paper concludes by dealing briefly with representative production coach and locomotive bogies of recent design to illustrate how observance of fundamental considerations results in satisfactory performance. These are: the British Railways standard double-bolster; British Railways-Commonwealth; Schlieren; SIG; Russian standard; Minden-Deutz; S.N.C.F. Y.20 B; München-Kassel; German Federal Railway locomotive; and a modern tram bogie. Of these designs, he seems to regard the SIG type with the most favour, commenting that the "clean and attractively simple layout is worthy of attention." The inclusion by Mr. Koffman of the British Railways standard bogie, as a "successful representative" type is interesting in view of criticisms.

LETTERS TO THE EDITOR

(*The Editor is not responsible for opinions of correspondents*)

Wheel and Rail Lubrication

November 9

SIR,—I was interested to read the article in your issue of October 11 on the subject of wheel and rail lubrication as dealt with in a paper by Dr. Fritz Birmann.

Whilst holding the appointment of Government Inspector of Railways, Burma, in 1939, I was much interested in the way the Burma Railways were overcoming the problems of flange and rail wear on the very sharply curved sections of the Lashio branch.

The method used was to fit check or guide rails on all

Check rails to reduce flange and rail wear used on narrow-gauge railway of Burma Corporation

curves above a certain curvature. The clearance of these rails from the inside running rail of the curve was such as to ensure no wear occurred on the outer rail. The inside face of the check rail was lubricated, by hand, the whole of the lateral tendency being restrained by the pressure of the inside of the wheels against the fully lubricated surface. The check rail was held in place by special high tensile bolts with pipe or cast iron distance pieces.

When first fitted, the hand lubrication had to be frequent, but after some time the back of the wheels acquired a lubricated surface and the re-lubrication of the check rails less frequent. The check rails were those released from relaying. If I recollect rightly, some difficulty was experienced at first in obtaining suitable bolts, but otherwise the system was most successful.

I enclose a photograph of this system as also applied on the narrow-gauge railway of the Burma Corporation.

Yours faithfully,

R. GARDINER

The Peruvian Corporation Limited,
Apartado 1379, Lima

Emergencies on the London Underground

November 13

SIR,—On November 12, a crowded Inner Circle train was held up in the tunnel between Edgware Road and Baker Street stations for 30-40 min. In my coach no one fainted or became ill, despite the long strain on standing passengers. During my incarceration as a standing passenger, two ideas occurred to me.

Entrapped passengers should be taken to a station as soon as possible, and there should be some means for passengers to communicate with the guard, that is to say, a means of communication besides the alarm signal already provided.

It seems that the freedom from any major tragedy on the London Underground must be attributed, in view of the miles run, to excellent maintenance plus good luck. Perhaps we are apt to forget that tube trains run on tracks, which could be jumped, and that overheated insulation from a hot motor could rapidly create enough acrid smoke to cause panic among packed passengers. The physiological discomforts caused by enforced standing in hot, crowded trains are obvious; the physiological dangers are less obvious, but real.

To minimise the dangers of the present situation I make, as a layman, the following suggestions:

Extend the present driver/guard telephone system to include each coach. In a crisis a reassuring word explaining the situation from the driver or guard might avert panic among the passengers; by the same token, if the passengers could report any serious local development and request urgent help, much of the potential horror due to isolation would be eliminated. It should remain possible for the driver and guard to converse privately.

Unless I am mistaken, the train in which I was held up had only just pulled out of Edgware Road for Baker Street; if it had been reversed into Edgware Road, passengers could probably have been liberated within 2 min.; this could have been arranged easily by telephone between the driver and Edgware Road without danger of collision. It is appreciated that reversal is undesirable in normal circumstances.

Yours faithfully,

IAN H. PARSONS

107, Hatherley Court, W.2

THE SCRAP HEAP

The C.P.R. Austrian Adventure

(*See our November 8 issue*)

Reference to the fate of the Canadian Pacific Railway observation cars which ran over the Austrian State Railway before the first world war was made in a paragraph in the November, 1920, issue of our associated journal *The Railway Magazine*. After the war, it was stated, the cars which had been requisitioned by the Austrian authorities and converted as ambulance coaches, "were handed back to the C.P.R. in pretty good shape. Recently they have been sold by the Canadian Pacific to the Italian State Railways," which were operating them as observation cars on scenic routes, and for a special party. With the paragraph was published an illustration of some cars of unmistakable North American design in Rome Station. The reference to the return to the C.P.R. is puzzling, as no record of any such return appears to exist.

Railway in the Desert

That railway [to Luderitz, in South-West Africa, built in the earlier years of this century] was one of the most difficult construction feats in the world, for the drifting sand and the lack of water were formidable enemies. Apart from the huge gangs at work on the line, the Germans had to bring up 1,500 Afrikaner transport riders from the Cape to carry food and water by wagon to the desert gangs. They formed a town of their own in Luderitz, all under canvas. There was also a camel corps with more than 1,000 camels operating along the railway line in the desert.

Many residents recall the early trains running up through the Namib to Aus, when they travelled in open trucks and carried their own bedding and beer. For 80 miles both sides of the line were littered with bottles.—*From "Panther Head" by Lawrence G. Green. (Stanley Paul & Co. Ltd.)*

Malayan Railway Stamps

The Government of the Federation of Malaya has recently introduced a series of pictorial stamps showing the major industries of the country. Each of the states forming the Federation has its own stamps, and before Malaya became independent, on August 31, 1957, the two British settlements of Penang and Malacca also had their stamps.

The stamp features the East Coast Line of the Malayan Railway, which runs for 327 miles through some of the wildest and most mountainous jungle country in the world. The route is one often followed by tourists visiting Malaya. The train shown is that used by General Templer in 1953, when, as High Commissioner, he reopened the East Coast Line after its reconstruction from the damage and neglect caused by fighting in 1941, and the Japanese occupation. The train is shown at Gua Musang (Cave of the Jungle Cat), a small township in the South of Kelantan.

Malayan stamps showing the High Commissioner's train, drawn by two North British locomotives, at Gua Musang in 1953

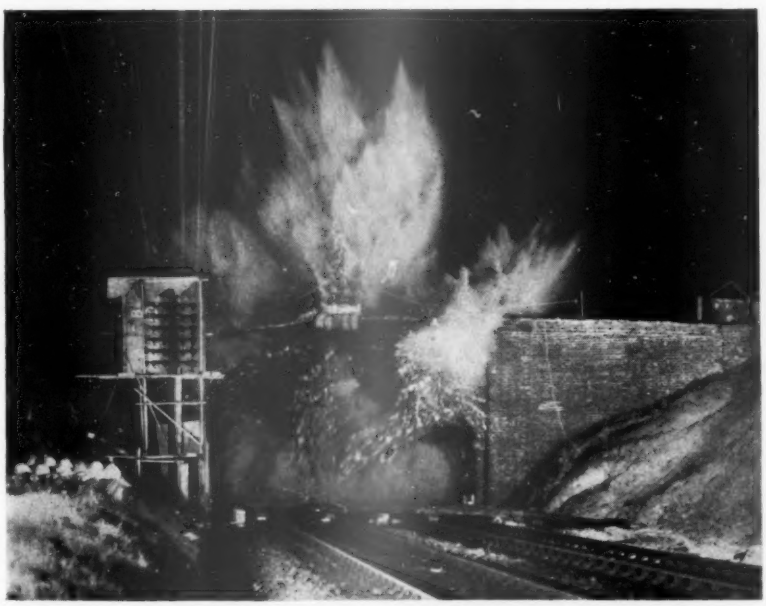
The train shown was hauled by two "O" class locomotives manufactured by the North British Locomotive Co. Ltd. In the near future, 1,500-h.p. diesel-electric locomotives manufactured by the English Electric Co. Ltd. will be introduced on this line, with air-conditioned coaches.

Handing Over a Diesel

(*See page* 607)

At the end of the platform the shining machine halted for five minutes so that Lord Rusholme, as befits a member of the Transport Commission showing off his new baby, could pose for the photographers in what appeared to be the conflicting parts of engine-driver, guard, cheery passenger, and proud father. Then, with another piercing hoot, the locomotive was guided back to the red carpet. (Although Lord Rusholme's hand was deceitfully on the control lever, the real work was done elsewhere by a grey-haired driver wearing pristine overalls, a white shirt, and a new tie.) The stationmaster of Euston then completed the ceremony with a courtly gesture that very few people other than royalty can have received—the doffing of his top hat.—*From "The Manchester Guardian."*

Southern Region Engineering Work



Bridge 179 *over the main line between Rainham and Newington, Southern Region, being demolished* (*see page* 611)

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

New Locomotives and Rolling Stock

During the first half of this year the South African Railways placed 23 new electric units (class "5E") and 20 new steam locomotives (class "GMAM") in service. In addition, 23 first class main-line coaches and 34 third class suburban passenger coaches were placed in service. All the passenger vehicles were built in the S.A.R. workshops.

New goods stock placed in service during the first half of the year consisted of 256 bogie cattle wagons, 48 bogie petrol tank wagons, and 1,943 goods vehicles of other types, making a total of 2,247.

EAST AFRICA

Colonial Secretary Visits Kilindini

Mr. Alan Lennox-Boyd, the Colonial Secretary, on his first visit to Mombasa, recently inspected the East African Railways & Harbours port installations at Kilindini. Arriving from Tanga by air, he was met by the Governor of Kenya, Sir Evelyn Baring; Mr. W. Urquhart, Deputy General Manager; and other senior officers of E.A.R. & H. Mr. Lennox-Boyd was shown the plans for the new Kipevu berths, and the layout of the port and harbour installations.

New Passenger Ship for Lake Victoria

A new passenger ship for service on Lake Victoria is to be built for the East African Railways & Harbours Administration by Yarrow & Co. Ltd., of Glasgow, at a total cost of £686,000. The vessel will have accommodation for 319 passengers and will carry up to 10 motorcars and 5,000 cu. ft. of refrigerated cargo. After completion she will be dismantled, transported in parts by sea and rail, and reassembled at Kisumu, the main port on the lake.

INDIA

New Station at Raja-ki-Mandi

A new pasenger station has been opened at Raja-ki-Mandi, on the Central Railway (former G.I.P.R.) Bombay-Jhansi-Agra-Delhi main line. The station, which is a short distance north of Agra Cantonment Station, serves the northern part of the city. The new station is in the fork formed by the diverging tracks of the Agra-Delhi line and the connecting line from Agra Cantonment to Agra City and Tundla, on the Northern Railway (former E.I.R.) main line. It replaces the wayside station opened by the G.I.P.R. in 1906; here the platforms were too short for the long mail and express trains which began to stop after the first world war.

Eastern Railway Stations Improved

Electrification works on the Eastern Railway include construction of high-level platforms at a number of stations, also restoration and re-opening of halts which were closed and abandoned some time ago.

Work is to be expedited on the new passenger stations at Bhagalpur, Chittaranjan and Dhanbad. Dum Dum passenger station and yard are to be remodelled.

Theft of Railway Materials

Although there was a marked fall in the number of crime cases registered during 1956-57 compared with 1955-56, thefts of railway materials on the Eastern Railway, principally carriage and wagon fittings, have increased.

The trouble first started with the removal of brass bearings from the axle-boxes of wagons left in outlying sidings or at wayside stations. Next came thefts of electrical fittings in coaching stock. Recently thieves started wholesale removal of cast-iron brake blocks from wagons in the Asansol-Sitarampur area. In consequence, the number of accidents in yards in this area greatly increased.

CANADA

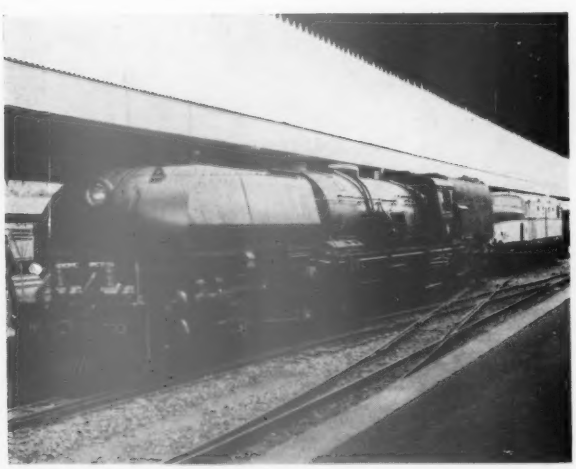
Short-Wave Radio Installations

Mr. L. R. Smith, General Superintendent, Saskatchewan District, Canadian Pacific Railway, recently has told the Kellock Commission that the C.P.R. planned to install short-wave radio equipment on freight trains operating west of Calgary and Fort Macleod, provided permission was received to eliminate firemen on freight and yard diesel locomotives. The estimated cost is some $408,000.

A master transmitter and receiver would be placed in each locomotive cab with walkie-talkie units at the front and rear ends of the train. The equip-

Diamond Jubilee of the Rhodesia Railways

(See paragraph on page 610)



Beyer-Garratt "20th" class and English Electric "DE 2" diesel-electric locomotive displayed in Bulawayo Station

First class all-steel coach and dining car set "Zambesi" on show; the dining cars were built in the Bulawayo workshops

ment would give the remainder of the crew instant communication with the driver.

ARGENTINE

Province of Buenos Aires Railway

The last act of the absorption of the Province of Buenos Aires Railway by the General Belgrano Railway, already in force to all intents and purposes for some time past, was concluded on October 7, when the different departments of the former line became dependent directly on the departmental heads of the latter.

UNITED STATES

Leasing Locomotives

In seeking quotations for 165 diesel-electric road-shunting and 35 yard-shunting locomotives, the Pennsylvania Railroad is asking for alternative tenders, one for outright purchase and the other for leasing the locomotives for a period of 15 years, with the option of renewing the leases of any or all of the locomotives on an annual basis up to a maximum of 10 additional years. The Pennsylvania also has sought a basis from the bidders at to what they will be prepared to pay the railway on the expiration of the leases in the event of the locomotives being sold to or leased by any other railway.

The terms proposed by the railway are either an annual or semi-annual lease payment during the initial 15 years period, and a daily rental during any period over which the leases may be extended. The types of locomotive specified are 50 Co-Co and 85 Bo-Bo road shunters of 1,600 to 1,800 h.p., with 30 Bo-Bo "B" units (without driving cabs, to work multiple-unit with "A" units), and 35 Bo-Bo yard shunters of 1,000 to 1,200 h.p.

HUNGARY

Manufacture of Passenger Coaches

The prototype of an 80-seater, eight-door passenger coach is being built at the State Railways Works. This type of coach will be put into service on internal routes. Mass production is expected to begin next year. The additional doors, four on each side, are designed to reduce waiting time.

At the Dunakeszi Works, in the north of Hungary, passenger coaches are being built for international services. Each coach will have nine six-seater compartments. Seats will have adjustable head, arm, and foot rests. Tubular lighting will be used in corridors and compartments.

The outsides of the coaches will be green. The corridors will be lined with cherry-red artificial leather, and compartment interiors with buff-coloured artificial leather.

The under-carriages will be enclosed with aluminium. Aluminium foil is being used for heat insulation.

The State Railways Works is to deliver 10 lightweight sleeping cars to Jugoslavia by the end of this year and another 10 next year. The cars weigh 40 tons. They have 10 two-berth compartments, lined with mahogany. One of the end compartments in each coach is to be fitted with a refrigerator and a hot plate for light refreshments.

SPAIN

Plan for Diesel Traction

The R.E.N.F.E. is expected to embark shortly on a new programme of introducing diesel traction on lines which have insufficient traffic to justify the cost of electrification. An initial order for 50 locomotives is envisaged, probably to be followed by a similar order later. The use in Galicia of diesel-electric locomotives to be purchased from the U.S.A. with an Import-Export Bank loan is the subject of editorial comment in our issue of November 1. An Alsthom diesel locomotive was exhibited in Madrid recently, and is reported to have been running trials.

Publications Received

The True Book About Oil. By Frederick E. Dean. London: Fredk. Muller Limited, Ludgate House, 110, Fleet Street, E.C.4. 7½ in. × 5 in. 142 pp. Illustrated. Price 8s. 6d.—The increase in diesel traction has made oil even more important than ever to railways as a fuel, apart from its rôle as a lubricant. In this book, written primarily for young people but nevertheless valuable for adults with little previous knowledge of the subject, the story of oil is told from its creation in the earth to the drilling of the last few decades and the modern processes of refining and breaking down for the use of man.

Southern Electric. By G. T. Moody. Hampton Court, Surrey: Ian Allan Limited, Craven House. 9¼ by 6¼ in., 172 pp. Illustrated. Price 25s.—When railway electrification south of the Thames began, a day at the sea was still an occasional bank holiday treat for many Londoners. Today the summer services on the Southern Region electrified lines from Victoria provides a train to the seaside about every seven minutes between 9 a.m. and 3.59 p.m. This fact, quoted by Mr. Moody, emphasises the social and economic changes which have taken place during the growth of the Southern Electric system. The scope and pace of electrification on the Southern have been on a scale which fully justifies an individual history. Mr. Moody traces the growth of the system in detail, and in connection with each opening gives particulars of the services provided by the electric trains. His book also forms a comprehensive record of the evolution of Southern multiple-unit stock, coming up to the main-line units of 1956. Other technical features, such as signalling and power supplies, are dealt with concisely, and some 11 pages are devoted to the events of the second world war. A book of this type is necessarily mainly factual, but it is diversified by many incidents and sidelights which help to give life to a story now accorded its due place in railway history. All stages in the development of the system are represented in the numerous illustrations, and in addition to London area and general maps there are four track occupation diagrams.

The Wrexham, Mold & Connah's Quay Railway. By J. M. Dunn. Lingfield, Surrey: The Oakwood Press, Bucklands, Tandridge Lane. 7¼ in. × 4¾ in. 32 pp. + 8 pp. illustrations. Paper covers. Price 7s.—The subject of this book is a little-known railway with a very unusual story. It was built to give the coalfield in Flint and eastern Denbighshire a direct outlet northward to tidal water, and this was achieved in the 1860s in the face of G.W.R. opposition. By reason of its poverty, the railway was at the mercy of powerful neighbours, and finally was taken over by the Great Central. At grouping, this gave the L.N.E.R. its only foothold in Wales. The author has made good use of official records, and personal papers, and with the aid of 22 illustrations, three maps, and a complete table of locomotives, has presented a fascinating sidelight on local railway history.

Wickman Technical Bulletin No. 1.—The first issue has been published by Wickman Limited, P.O. Box No. 44, Bauer Lane, Tile Hill, Coventry, of a technical bulletin, which it is proposed to issue regularly in the future. No. 1 is concerned with Mipsa precision grinders. The purpose of these publications is to keep the representatives and correspondents of the manufacturer informed of interesting features and applications of machines and tools which it manufactures or handles as selling agents.

Scottish Region Freight Services Booklet.—The Scottish Region of British Railways has produced a comprehensive booklet listing all the principal freight train services from the main cities and towns throughout Scotland. This follows the booklets previously issued giving particulars of services from some of the main cities, and has been published with the object of enabling traders to co-ordinate production with transport requirements. British Railways have done much recently to improve and augment their express freight train services throughout Scotland and to the main points in England and Wales, and the new booklet indicates the progress made in this direction.

Type "1" Diesel-Electric Locomotive for British Railways

Bo-Bo 800-h.p. 68-ton unit for main-line freight duties

800-h.p. Bo-Bo freight locomotive with B.T.H. electrical equipment

THE first of the batch of 10, 800-h.p. diesel-electric locomotives being built by the British Thomson-Houston Co. Ltd. for British Railways was handed over on November 18, as recorded elsewhere in this issue. Ordered in the autumn of 1955, this unit is the first of the 20 then ordered of this type and power (800 h.p.) to be delivered to British Railways. The locomotive is also the first type to be delivered since the decision to designate power categories by type numbers was made; reference to this scheme is made on another page.

These 10 locomotives will be numbered D.8200-D.8209; they will be allocated to Devons Road Motive Power Depot in the London Midland Region to work freight trains between Poplar, Temple Mills, Acton, and Willesden.

Designed primarily for main-line freight duty, the unit has a maximum designed speed of 60 m.p.h. and a maximum starting tractive effort of 37,500 lb.; it is capable of exerting a continuous tractive effort of 20,000 lb. at 10·5 m.p.h., with a wheel diameter of 39 in.

The locomotive has been designed to the general requirements of the British Transport Commission under the overall direction of Mr. R. C. Bond, Chief Mechanical Engineer, and Mr. S. B. Warder, Chief Electrical Engineer, British Railways Central Staff, B.T.C. Mr. J. F. Harrison, Chief Mechanical & Electrical Engineer, London Midland Region, has been responsible for liaison with the contractors and for inspection during construction and preliminary testing. Mr. John Barnes, of Allen-Bowden Limited, Leamington Spa, has acted as Design Consultant on behalf of the B.T.C. Design Panel.

The British Thomson-Houston Co. Ltd., besides acting as main contractor for the whole locomotive, provided all the electrical equipment and carried out the erection and wiring of the equipment in the locomotive, and subsequent testing.

The mechanical structure was designed by the Clayton Equipment Co. Ltd., in close collaboration with the British Thomson-Houston Co. Ltd. The bogies and the superstructure of the locomotive were built by the former company at its Tutbury Works.

The underframe was built by the Yorkshire Engine Co. Ltd., Sheffield, and the final assembly and painting of the complete locomotive were carried out by the same company.

The diesel engine was provided by Davey, Paxman & Co. Ltd. which also undertook the coupling up of the generator unit.

The locomotive is of generally conventional design, two four-wheel swing bolster bogies being used. The bogies are fitted with spherical centre pivots which support the body weight and transmit tractive force; side bearers to limit rolling are provided. There is a nose-suspended traction motor mounted on each axle, driving through single reduction gearing with a resilient gearwheel.

The body comprises a power unit and radiator compartment, a driver's cab, and a short rear compartment housing the control equipment and certain auxiliaries.

Power Equipment

The Paxman 16-cylinder YHXL 7 in. bore × 7·75 in. stroke Vee-type diesel engine is rated at 800 b.h.p. at 1,250 r.p.m.; it is coupled to a B.T.H. 6-pole, 500-kW. generator rated at 690/337V., 720/1,320 A. The engine-generator set is resiliently mounted at four points on the two I-girder longitudinals which form the principal

Locomotive with compartment doors open showing engine and generator, and control cubicle

members of the underframe. The auxiliary generator is an 8-pole machine rated at 40 kW., 110 V., 625/1,250 r.p.m., the armature being carried on an extension of the main generator shaft. The exciter is mounted on an adjustable platform on top of the auxiliary generator frame, and is belt-driven from the main generator shaft.

The main control gear is located in the short compartment behind the driver's cab, which is away from engine fumes and heat, where it is free from contamination by oil or water, and is easy and convenient of access. The driver's cab is arranged with two driving positions, diagonally situated. The locomotive is fitted with compressed-air brakes, and with vacuum exhausters and control equipment for application of vacuum train brakes; it is arranged for operation in multiple with certain locomotives of similar or of greater rating in groups of up to three locomotives.

Leading particulars of the locomotive are as follow:—

Length over buffers	42 ft.
Length over headstock	38 ft. 6 in.
Bogie centres	22 ft. 6 in.
Bogie wheelbase	8 ft. 6 in.
Weight in working order	68 tons
Fuel tank capacity	400 gal.

Rear end view of 800-h.p. B.T.H. locomotive in service

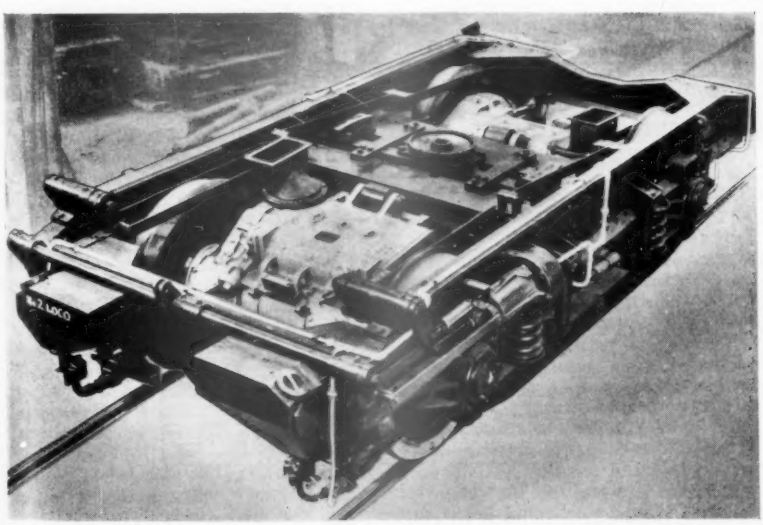
Traction Motors

The four motors are of the nose-suspended, series-wound type, driving through single reduction gearing. They are force-ventilated, two separate motor-driven blowers being mounted in the body of the locomotive, each providing ventilating air to a pair of motors.

The nose suspension is in the form of a link employing Silentbloc bushes at each end. A further link with Silentbloc bushes is connected horizontally between the motor frame and the side of the bogie. This second link controls lateral movement of the motor irrespective of side movement of the axle, thus reducing flange wear and improving the riding of the locomotives. A lead-acid battery specially designed for engine starting duty is provided. This is charged by the 110-V. auxiliary generator controlled by a Brown Boveri sector-type regulator.

A Westinghouse CM38 compressor under the control of an automatic governor is provided for air brakes and air services such as sanding, whistle and control. Two Westinghouse 4V110 exhausters are provided.

The bogie solebars are of deep channel section spaced by headstocks and cross-bearers; riveted construction is used with joints reinforced by gusset plates. A swing bolster is provided with a double-elliptic spring at each end. The axleboxes are in cast steel and are fitted with SKF single-row, self-aligning roller bearings. The horn guides are of cast steel and are provided with manganese-steel wearing plates as are the axlebox sides and flanges. The equalising beams are underslung and thus centralise the load on the axleboxes; horn guide friction thereby being much reduced. Main suspension is by helical springs on the equalising beams; damping is provided by Woodhead-Monroe hydraulic shock absorbers. Clasp brake rigging is fitted on the bogies, with two brake blocks per wheel. Two 10-in. air brake cylinders with combined slack adjusters are fitted to each bogie.



Bogie for locomotive showing traction motors and brake gear

Underframe

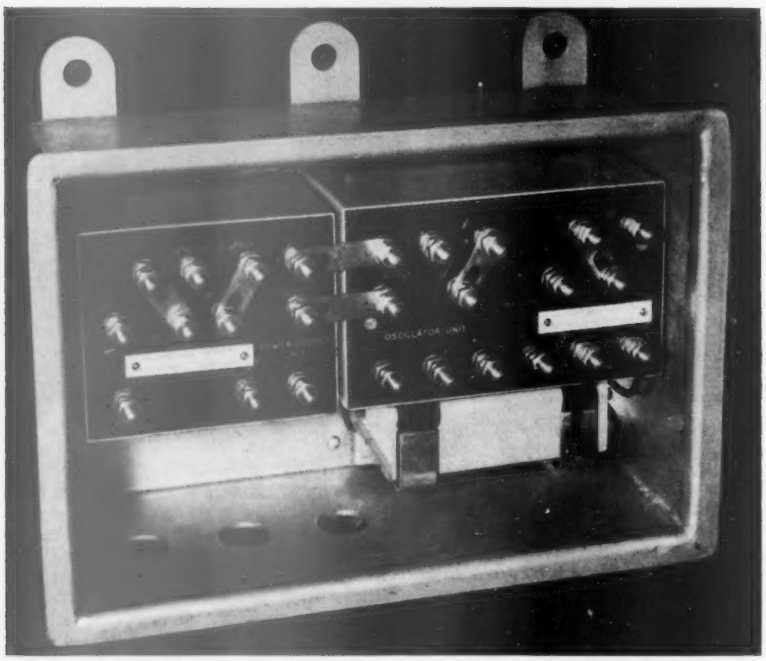
The underframe is designed to have a rigid construction to reduce deflection to a minimum. It consists of deep channel longitudinals with channel solebars. A ⅜-in. footplate is provided on top of the underframe. Bolsters and cross-bearers, of channel and plate section, are riveted and like the bogies have gusset plate reinforcement at the joints. The battery boxes and fuel tank are slung beneath the underframe and between the bogies.

Superstructure is constructed of mild steel plating upon an angle framework. Horizontal, adjustable louvres are provided at each side of the locomotive to control air to the radiators. The radiator fan is mounted horizontally below the roof of the housing and is mechanically driven through a bevel gearbox from the engine. Full depth, hinged doors are provided on each side of the engine and generator housing, and hatchways are fitted in the roof over the engine. An angle is continuously welded to the upper surface of the footplate around the engine to

(Continued on page 593)

Rail Circuits without Insulated Joints

London Transport uses short lengths of normally de-energised track circuit, known as "rail circuits," for special signalling controls and has developed a 10-kc. type which requires no insulated joints



Track feed set used with 10-kc. "rail circuits" in London Transport signalling installations

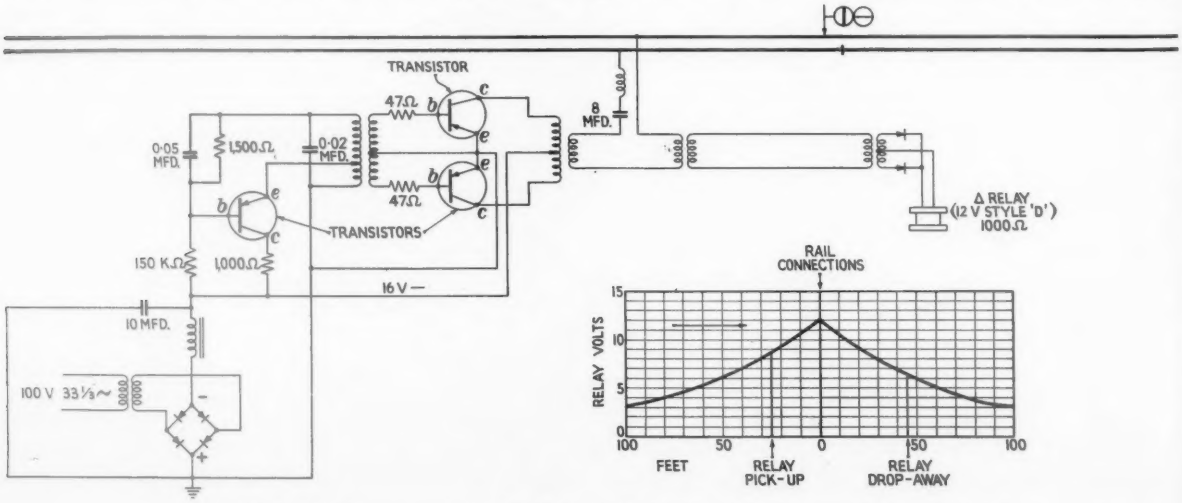
WHAT is known as the closed track, now so widely used to show whether a given section of track is, or is not, occupied by a train or vehicle, is so constructed that a current must flow continuously throughout all parts of it to indicate that the portion of line concerned is unoccupied. The current is shunted away from the relay when a vehicle enters the circuit, producing the release of its armature and bringing the desired signalling control into operation. Any defect in the circuit, such as a broken bond, relay winding or other electrical connection, or failure of the power supply, will have a like effect and produce an indication of track occupancy. In signalling language the circuit is arranged to fail on the safety side.

This is satisfactory as long as it is merely a question of being able to register track occupancy for the purpose of establishing a restricting control of some kind, such as holding a signal at danger or preventing points from being moved at the wrong time. It is desired sometimes, however, to release certain interlocking conditions when a train reaches a particular position and at no other time, and it is not satisfactory to rely merely on the working of a normal closed type track circuit, since this can become shunted accidentally for a moment, or suffer some failure producing the effect of a train having reached it.

"Delta" Circuits

It becomes necessary, therefore, to resort to an open—that is normally de-energised—circuit, in which the path for the current is completed by the presence of a vehicle, but as this cannot be used with safety to operate any actual locking control its length must be kept very short, so as not to interfere with the continuity of protection afforded by the ordinary track circuits of an installation. For some years London Transport has been using such short open track circuits, officially known as "rail circuits." These are designated on diagrams by Δ, and in consequence are commonly referred to as "delta" circuits. It is necessary to put in additional insulated rail joints where such circuits are installed, giving an effective length of about 11 ft.

Such circuit will not, of course, pro-



General electrical arrangement of jointless rail circuit and items essential to operation

duce the releasing effect if some part of it becomes disconnected, enabling it to be used with safety, in association with other controls, to release routes where, say, pre-selecting is in operation, or provide a delayed clearance for a signal or other like effect, as may be necessary. Insulated joints, however, cost money to install and maintain in order, while the civil engineer always is anxious to see as few of them as possible in his track. Attention has been directed therefore to obtaining the "rail circuit" effect without having to use any additional joints and electronic equipment operating at relatively high frequency has been adapted to this requirement, as here described. (The frequency used, although a high one for track circuit work, would be regarded as low for radio or telecommunications.)

Jointless Rail Circuit

The accompanying diagram shows the general electrical arrangement of the circuit and those items essential to its operation, while the photograph illustrates the lineside apparatus. By using full wave rectification from the ordinary signalling supply, which on L.T.E. lines has a frequency of 33⅓, and transistors in conjunction with certain condensers, reactances and resistances, a 10 k/c current is created and imposed by transformation on a resonant circuit including the track rails.

By another transformer connection and rectifier the so-called Δ relay becomes energised when a pair of wheels comes within about 25 ft. of the point where the track leads are connected to the rails and remains so until the wheels have passed about 45 ft. beyond it, enabling the "stick" control essential with the earlier form of rail circuit to be dispensed with.

At other times the impedance offered in the rails is much too large for any appreciable current to reach the relay. There is no interference from the normal 33⅓ cycle track circuit current and the high frequency equipment cannot affect the ordinary track circuits in any manner. The rail circuit relay, which may be located up to 500 yd. from the track, is operated through equipment placed close to it and cannot be affected by extraneous d.c. or mains frequency a.c. at any part of the circuit.

As the effects of inductance obtained from a 10-k/c circuit are much higher than anything arising from ordinary signalling circuits the leads from the feed set to the rails have to be kept short and twisted together, all wiring kept as far as possible from telephone circuits and, when in relay rooms, carried out with paired wires, feed and return twisted together.

These new jointless rail circuits have been applied at many locations in connection with the new signalling operated from the re-equipped Cromwell Road signalbox at Earls Court, District Line, described in our issue of August 9 as indicated on the folding plate diagram of the layout then given. One of their principal uses is in connection with the release of route locking control on facing points, in association especially with pre-selection facilities, where a rail circuit must be actuated to prove the presence of a vehicle before such release can be given. It is then located 470 ft. ahead of the points to which it refers.

Another function is to release the backlock on a signal next in rear of the one standing at the facing points when a train has come to a stand at the latter, while yet another is to approach release a signal used to permit a train to come slowly up to another which is protecting a fouling route, so allowing the points in rear to be cleared and reversed as quickly as possible for another movement. The first signal in such cases itself locks the points in advance in whatever position they happen to be. The high frequency rail circuit may be said to be also a substitute for the much older treadle, or rail contact, used with interlocking block systems, requiring no adjustment for weight of rail and loads and functioning with certainty at any speed, however low. There are some 24 examples of it in service at the present time on L.T.E. lines.

Type "I" Diesel-Electric Locomotive for British Railways

(*Concluded from page* 591)

form a sump; drainage is provided to the side of the locomotive from which any leakage of oil may be drawn off. A handrail runs the length of each side of the engine housing above the access doors and vertical handrails are fitted at the doors of the cab and at the end doors of the engine housing.

At each driving position there is a swivelling seat, master controller, air-brake valve, vacuum brake valve, sanding valve, deadman's pedal, two-tone horn valve and illuminated driver's instrument panel. A window wiper is fitted at each of the four cab look-outs; a food cupboard, cooker, tool box and hand fire extinguisher are also provided. A Pyrene automatic fire extinguishing system is fitted with one pull handle in the cab and one on each side of the cab accessible from the track. Two Clayton heaters, one at each driving position, and four demisters are provided. An engine instrument panel is fitted on one bulkhead and a "fault" panel on the opposite bulkhead. Sand is applied pneumatically to all wheels by the operation of an electro-pneumatic valve at each driving position. As stated above, the locomotive is powered by a Paxman 16-cylinder YHXL, pressure-charged by two Napier exhaust gas turbo-chargers, one of the manufacturer's standard traction range. The engine has a traction rating of up to 1,000 b.h.p. at 1,250 r.p.m., but for this application the fuel bar is set to develop 800 b.h.p. at this speed.

Features of the engine include a fabricated sump underbase which is fully stress relieved and shot blasted before machining, the drive end being extended to make provision for a single bearing foot-mounted generator; a crankcase, which is a one-piece fabrication embodying 10 under-slung crankshaft and liner housings, bolted to the sump underbase of high-strength aluminium alloy single-unit cylinder heads, each incorporating two inlet and two exhaust valves, with renewable aluminium bronze valve seats.

Individual type C.A.V. flange-mounted fuel pumps gear driven from the valve camshaft is operated by direct tappets. These pumps are mounted in-line down the centre of the engine on top of the fuel pump camshaft housing. The engine is fitted with a gear-type boost pump to ensure an adequate supply of fuel under positive pressure to the fuel pumps. The injectors are of the multi-hole needle type, spring loaded, they may be removed without disturbing the cooling system.

Contamination of the lubricating oil by fuel oil leakage is stated to be impossible as lubrication of the fuel pump and fuel pump camshaft is achieved by a separate lubricating oil system provided with its own sump, pump and strainer, completely isolated from the main lubricating system.

Two centrifugal circulating water pumps, one for each bank, are driven from the free end of the engine.

A motor-driven lubricating oil priming pump, incorporated in the starting circuit, is arranged to prevent the engine being started with "dry" bearings.

Engine shut down is effected by de-energising a solenoid in the governor which shuts off the supply of lubricating oil to the governor which in turn will cause the supply of fuel oil to the engine to be stopped.

Sub-contractors for the units include the following:—

Motor blowers ..	Aerex Limited
Filter panels	Air-Maze Limited
Driver's controllers and instrument panels	Allen Bowden Limited
Voltage regulators ..	British Brown-Boveri Limited
Batteries	Chloride Batteries Limited
Mechanical parts design and manufacture of bogies and superstructure	Clayton Equipment Co. Ltd.
Engines	Davey, Paxman & Co. Ltd.
Junior equipment and cookers	English Electric Co. Ltd.
Fire gongs	Gent & Co. Ltd.
Window wipers ..	Laycock Engineering Limited
Exhauster motors ..	Mawdsley's Limited
Ammeters	Record Electrical Co. Ltd.
Radiators	Serck Radiators Limited
Cable	Siemens Edison Swan Limited
Conduit	Simplex Electric Co. Ltd.
Axleboxes	Skefko Ball Bearing Co. Ltd.
Lighting equipment ..	J. Stone & Co. (Deptford) Ltd.
Brake equipment ..	Westinghouse Brake & Signal Co. Ltd.
Manufacture of underframes and assembly of locomotives	Yorkshire Engine Co. Ltd.

Long-Welded Rails on East Coast Main Line

Replacement of 60-ft. rails by 300-ft. lengths welded into one-mile-long section

THE first long welded rails on the East Coast main line were laid by the Eastern Region of British Railways on Sunday, September 29, on a section of line just south of Carlton-on-Trent where a continuous stretch of almost a mile now exists.

Normal 60-ft. rails were first flash butt welded into 300-ft. sections at the Chief Civil Engineer's Depot at Chesterton Junction, near Cambridge. Five 50-ton "salmon" bogie bolster wagons —to which cranes can be fixed for unloading— were required to convey a number of these lengths of rail, and a special train of some 10 wagons carrying 50 lengths of rail travelled to the site at Carlton-on-Trent. Curves in the line presented no difficulty as the 300-ft. lengths are sufficiently flexible.

The District Engineer, Doncaster, Mr. H. T. Bird, who was in charge of operations, had full possession of the main lines between Newark and Tuxford from 3 a.m. on the Sunday until 3 a.m. on the Monday.

Placing Lengths in Position

During this period 300-ft. lengths of rail were unloaded by cranes on the special train on to the sleeper ends of the track where they were to be positioned. The existing 60-ft. rails were removed from the base plates and the complete 300-ft. lengths levered into position by means of crowbars.

Joining 300-ft. Lengths

On the site, the ends of the rails to be joined together were held in a mould about ½ in. apart and heated over a petrol flame until red-hot. A conical-shaped vessel placed over the mould was filled with a mixture of powdered metal and magnesium. When this was ignited and the powdered metal melted, a plug was removed allowing the metal to pour into the gap between the rail-ends.

The mould was knocked off as soon as possible and spare metal trimmed by cold chisel and grinder. Each weld took about 45 min. to complete.

Of the 50 lengths unloaded, 34 forming 17 pairs in the down main line form the longest continuously-welded length of nearly a mile. Seventy-four men were employed on this work completed within the allotted 24 hr.

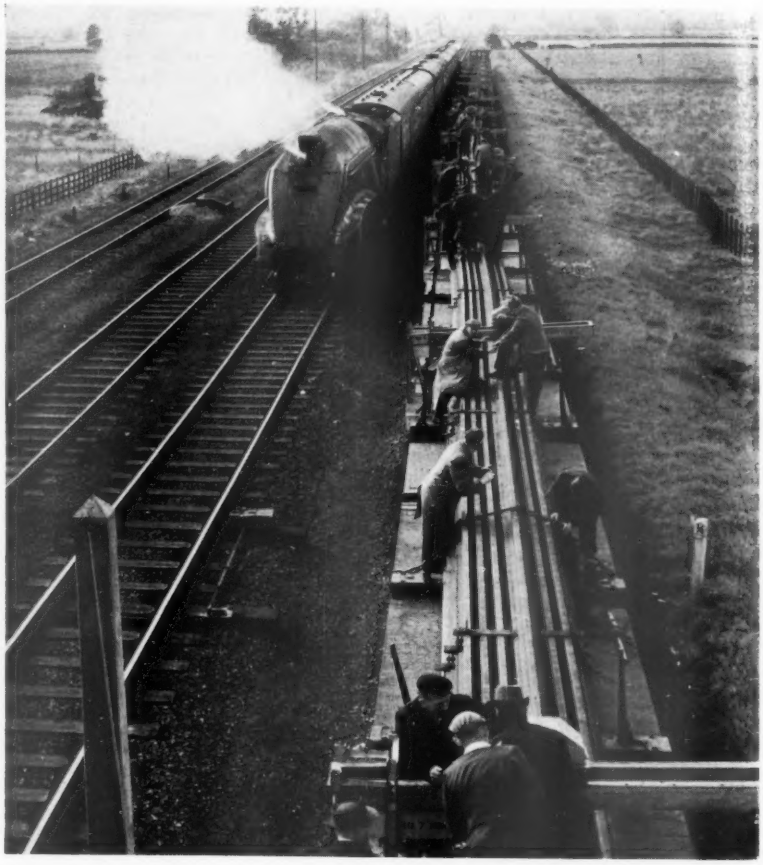


Photo courtesy] ["*The Yorkshire Evening Post*"

Preparing to unload 300-ft. long welded rails on the Eastern Region main line near Carlton-on-Trent

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MUSKHAM VIADUCT RECONSTRUCTION.—Muskham Viaduct, on the Eastern Region of British Railways, which was constructed in 1852, carries the East Coast main line over the River Trent just north of Newark. Earlier this year three of the five arches of the viaduct were reconstructed, and during the time the work was being carried out trains which normally pass over this part of the line were diverted. The two remaining arches were reconstructed during the weekends 9-11 and 16-18 November, and to enable the work to continue uninterrupted train services were diverted and consequently retimed. In addition to work on Muskham Viaduct the Engineer was also undertaking track relaying and bridge repairs between Ranskill and Bawtry. Whilst the work was in progress on Muskham Viaduct—from 1.30 p.m. on November 9 to 1.30 a.m. on November 11, and for a similar period the following weekend—trains which normally ran the East Coast main line between Grantham and Retford were diverted via Lincoln and did not make their advertised calls at stations between Grantham and Retford. In addition, from 3 a.m. on November 10 and 17 to 3 a.m. on November 11 and 18, East Coast main-line trains did not call at Retford, but called instead at Gainsborough Lea Road. A special service of diesel trains linked Retford and Gainsborough Lea Road. During the periods trains were diverted via Lincoln, a special diesel rail service operated between Grantham and Newark North Gate, and there was a special road service between Newark North Gate and Retford and also between Newark North Gate and Lincoln Central to connect with trains calling additionally at Lincoln Central. This last service operated only from 12.30 p.m. on Sundays to 1.15 a.m. on Mondays.

B.T.C. CHAIRMAN ON INVESTMENT CUTS.—The Chairman of the British Transport Commission, Sir Brian Robertson, on his return to Britain on November 4 after his visit to Canada and the U.S.A., is reported to have stated that he could not pretend to like the cuts imposed by the Government on the Commission. They would be respected, he added, but the modernisation programme was necessary and eventually would go through. He believed that the sooner it went through, the less it would cost and the more quickly it would pay. Sir Brian Robertson had been visiting transport installations and studying North American railway practice.

ELECTRIC RAILWAY TRACTION SECTION

Alternating Current Systems Compared

IT appears that industrial-frequency traction still needs to produce some decisive advantage in its favour before controversy will abate. In this country most of the argument centres round the claims of industrial-frequency a.c. in comparison with the established d.c. systems, but elsewhere protagonists of low-frequency current have sought to show that there is still a future for 16⅔ cycles. In explaining its decision in 1955 to retain its existing electric traction system, the German Federal Railway was unable to accept unreservedly some of the statements supporting the 50-cycle system which had been made at the Lille congress on industrial-frequency traction held in that year by the French National Railways. While appreciating that the German decision was based on domestic conditions, the S.N.C.F. authorities feel, none the less, that some of the arguments used were of a more general nature, and in September published a special number of the *Revue Générale des Chemins de fer* in which their own conclusions were re-stated.

The point is made that the rapid development of 50-cycle practice has already caused some of the material presented at Lille to be out of date, and it is recalled that whereas the original Valenciennes-Thionville substations were equipped with Scott-connected transformers, later extensions and new schemes are using a majority of simple single-phase substations with the full approval of the electricity supply undertakings. It is also remarked that for more than a year all locomotives ordered have been of the rectifier type, and that 86 per cent of the orders being placed this year are for Bo-Bo designs weighing only 62 tons, since experience has shown that the haulage capacity of the existing 84-ton rectifier types is more than is needed for many purposes. In its statement, the German Federal Railway referred to a test of an 80-ton "E10" class locomotive in which a load of 1,420 tons had been started on a gradient of 1 in 100. This is contrasted with the 1,650-ton trains which the S.N.C.F. rectifier locomotives are allowed to haul in normal service on the Lille-Strasbourg section, and with the range of duties these locomotives can undertake without modification of gear ratio. On the other hand, the German "E10" class has a normal load limit of 900 tons on lines with a ruling gradient of 1 in 100, and to haul loads of 1,100 tons in these conditions the "E40" class is used, which has the same traction motor but a gear ratio which reduces the top speed from 81 to 62 m.p.h.

Much of this publication and its appendices cover ground already familiar, such as the detrimental effects of heavy standstill currents on a.c. traction motors, and the need for rapid acceleration, and hence for limitation of train loads. A less usual argument is pursued in taking up the German Federal Railway's point that private generation of railway power supplies is preferable to drawing on the national distribution system, and showing that even if this proposition were accepted, it would be more economical to generate at 50 cycles than 16⅔ cycles.

It is a curious result of the trend of 50-cycle traction that arguments in its favour are often now the well-known ones for the d.c. traction motor. In fact, these points tend to be emphasised as much today as previously were the economies of high-voltage overhead lines and control by transformer tappings instead of by resistances and series/parallel connections of the motors. From the designer's point of view the transformer, particularly in British loading gauge conditions, is a maior problem, and the attractions of the light overhead system have not entirely counterbalanced misgivings regarding its connection to single phases of the grid system. When possible developments likely to narrow the area of controversy are considered, the emergence of a new form of a.c. motor suitable for traction still seems far off, and more hope is attached to progress in rectifiers. Yet, even here, argument will continue for, assuming the appearance of a new design of revolutionary power: weight ratio, the cost and size of substations might be reduced to an extent which would raise again in lively form the question whether the locomotive or motor coach is the best place in which to install conversion equipment.

Electrification in Poland

SINCE the war important additions have been made to the electrified lines of the Polish State Railways, which now total some 400 route-miles compared with the 70 route-miles or so in the Warsaw area which had been electrified by 1938. Mr. Jan Podoski, M.I.E.E., in a recent lecture to the Utilisation Section of the Institution of Electrical Engineers in London, referred to the serious consideration which had been given in Poland to adopting 50-cycle a.c. traction at the time of the British Transport Commission's choice of this system in 1956. It was decided, however, to continue using 3,000 V. d.c. as in the original conversions, for only negligible savings in capital cost and still smaller advantages in maintenance costs could be foreseen. This arose in part from the moderate distances involved and the high proportion of suburban services; and from the difficulty which the Polish electrical industry would have had in changing to the a.c. system.

However, the eventual use of industrial-frequency a.c. has not been ruled out, but it seems likely from what Mr. Podoski has stated that by the time this might happen, the electrical industry in Poland will have been developed sufficiently to meet the requirements of the railways itself. He suggests that the principal opportunities for British manufacturers will occur in the next five or ten years, during which time the demand will be for 3,000-V. d.c. equipment. Conversion of main-line routes will increase the requirement for locomotives compared with the original Warsaw scheme undertaken by British contractors, which mainly involved multiple-unit trains. A further factor will be the decision taken earlier this year to build no more steam locomotives.

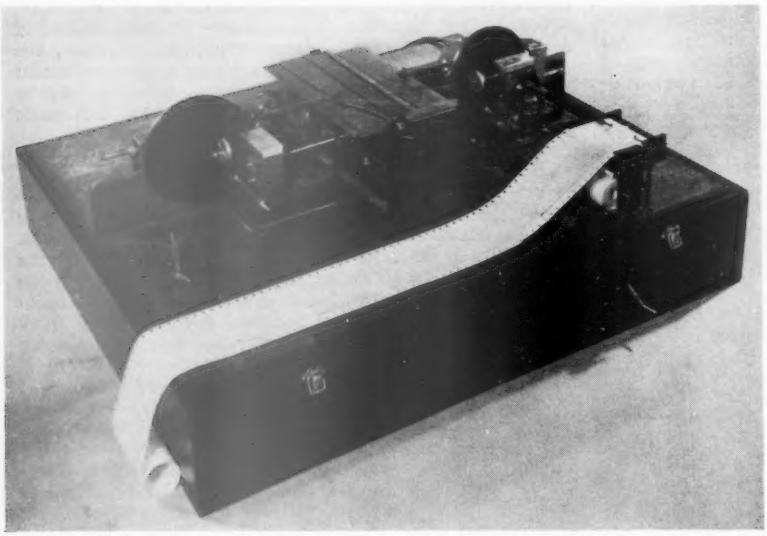
A Polish-built electric Co Co locomotive of 3,200 h.p. was illustrated in the course of the lecture. It was also mentioned that much of the rolling stock and electrical equipment for the 220-mile electrification linking Warsaw with the Upper Silesian coal basin, completed this year, came from East Germany. It is to be expected that the same source would share in equipping any 50-cycle scheme which might be undertaken later, for although the existing 16⅔-cycle system is to be retained in Western Germany, the considerable development of 50-cycle traction which is taking place in U.S.S.R. will no doubt be reflected in other territories where Russian influence is strong.

Other electrification schemes mentioned by Mr. Podoski include an interurban line between Gdansk (Danzig) and Gdynia which rapidly built up a traffic exceeding that carried by tramways, buses, and trolleybuses in the places served. It is now considered that electrification of some 3,300 route-miles out of the total Polish State Railways mileage of 17,000 would be fully justified. An average rate of conversion of 150 route-miles a year is suggested as economic. Coal economies are essential.

Poland has had to make a difficult decision. There semed to be a better case for retaining direct current than if earlier work had been at 1,500 V., and this was supported by other factors mentioned already. In general, the countries with 3,000 V. d.c. electrification have been satisfied to press ahead with their existing system rather than incur the slowing down of work inevitable when the radical change from a d.c. to an a.c. supply at some eight times the voltage is made.

Traction Run-Curve Grapher

Assistance in selecting traction equipment



General appearance of machine which provides data for selection of appropriate traction motor

TO help the selection, during project electrification schemes, of a traction motor suitable for the train service proposed, with the ability to run the service in the time specified having regard to varying operating conditions such as maximum running speeds, gradient and loading, a mechanical aid has been devised. This unit, termed the Run-curve Grapher, was designed and constructed by Mr. A. F. Harvey, Traction Department, British Thompson-Houston Co. Ltd.

Where it is possible to define the service in terms of a simple run repeated so many times in an hour or in a day, the calculations are simple and can be done quickly by any of the well known methods; but where many diverse runs have to be worked out it is a great advantage to be able to do the work with mechanical help. It was with this in mind that the machine was built.

Speed-Distance Chart

It produces a speed-distance chart, with time markings, from the following data:—train weight; tractive resistance; speed-tractive effort characteristic of the proposed motor; and run distance, gradients, and speed restrictions.

The machine consists essentially of the parts shown in Fig. 1. It is motor-driven; but manual operation is available for slow movements as required. The speed gearbox enables a number of ratios to be selected, so that the chart can be used to the best advantage over a wide range of operating conditions.

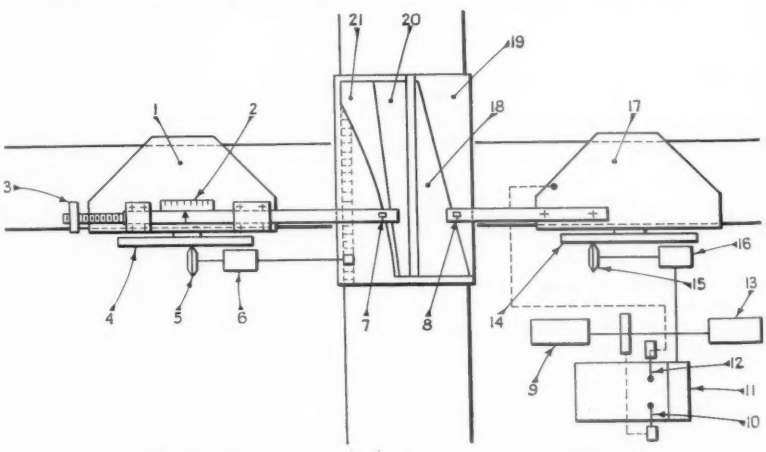
The chart is marked up beforehand with station locations, gradients, and speed restrictions. An acceleration template is cut to show net acceleration against speed, and a coasting template is superimposed. Selection is made by altering the position of the acceleration probe in a vertical direction. These two templates are cut from thin sheet material to suit the particular scheme under examination, and are clamped to the template carriage. If required, separate templates may be made for different field strengths.

A braking template may be provided on the machine but it is usually found more convenient to draw a braking line back from station stops on the chart using a suitable loose template. The speed template is permanent and unchanged for all conditions. The acceleration and speed carriages are counterweighted in order to keep the acceleration and speed probes against their respective templates. By adjusting the gradient nut, the acceleration due to any gradient is added to or subtracted from the acceleration obtained from the appropriate template. A gradient indicator is provided so that the degree of gradient being applied may be known.

Operation

In operation, the chart is set with the starting point in line with the speed marker; the gradient, as shown on the chart, is applied; the template carriage is set to zero; the counter reading (secs.) is noted on the chart; and the motor is switched on. The two discs revolve and drive the two wheels. The combination of acceleration disc and wheel integrates acceleration and time to move the template carriage in terms of speed. This in turn moves the speed carriage. The combination of speed disc and wheel integrates speed and time to drive the chart drum in terms of distance. The speed marker is linked to the speed carriage in such a way as to mark a speed trace on the chart. On arriving at a change of gradient the machine is stopped, the new gradient is applied and the machine is restarted.

(*Continued on page* 598)



1. Acceleration carriage
2. Gradient indicator
3. Gradient nut
4. Acceleration disc
5. Acceleration wheel
6. Acceleration gearbox
7. Acceleration probe
8. Speed probe
9. Timing gear
10. Timing pen
11. Chart drum
12. Speed marker
13. Counter
14. Speed disc
15. Speed wheel
16. Speed gearbox
17. Speed carriage
18. Speed template
19. Template carriage
20. Coasting template
21. Acceleration template

Fig. 1—Diagrammatic layout of machine

Rectifier Locomotives in Japan

New design for 60-cycle working on Hokuriku line

Class "ED 70" Bo-Bo rectifier locomotive built by the Mitsubishi Electric Manufacturing Company

With the inauguration on October 1 of industrial-frequency electrification between Tamura and Tsuruga, the Japanese National Railways placed in service the first of a new series of Bo-Bo rectifier locomotives known as class "ED 70." A gradient profile of this section, known as the Hokuriku line, was reproduced in our November 23 issue last year, and an illustration and dimensions were given of the Class "45" locomotive which formed the prototype of the present series. The electrification is at 20 kV., 60 cycles, this being the standard industrial frequency in the West of Japan. It will be recalled from the previous article that a trial a.c. electrification has also been carried out on the Senzan line in Eastern Japan, where the industrial frequency is 50 cycles. On this section series commutator motors have been used, but a rectifier system has been found preferable for the higher frequency.

The new "ED 70" locomotives, of which 18 are being built by Mitsubishi, have the Bo-Bo wheel arrangement and are mounted on Schlieren type bogies. Weight in working order is 60 tons. Power from the overhead line is fed through an air-blast circuit-breaker to the primary of a 2,410 kVA. transformer. Tappings on the secondary are connected through preventive coils to eight 8-in. ignitron tubes with anode reactors in series. The rectifiers are arranged in four pairs, the tubes of each pair conducting alternately on successive half-cycles to supply one traction motor. From the motors, which are permanently in parallel, the circuit returns to a centre tap on the secondary.

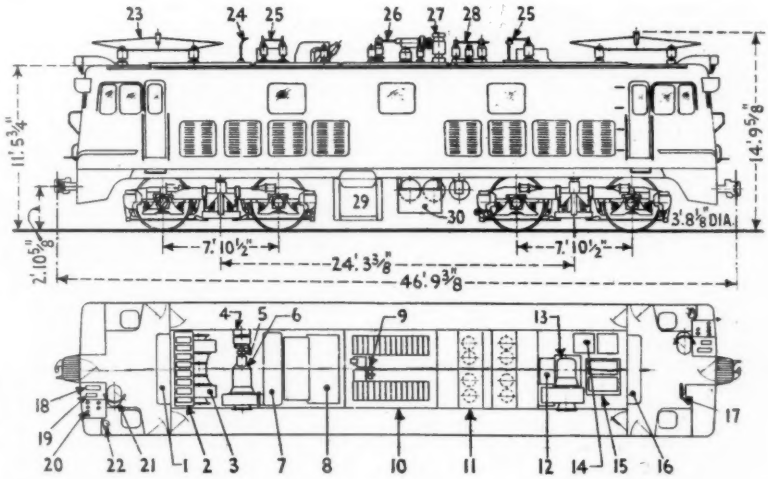
The rated capacity of the tubes is 710 A. at 750 V. Phase-control is used on nine of the 34 notches. One step of field-weakening by diverter resistance is provided, and reduces the field strength by 50 per cent. This reduction is effected on the first two and the last three notches.

One of the requirements of the design, based on experience with the prototype, was that the new locomotives should be capable of being made ready for service in 15 min. in an ambient temperature of 14° F. when no auxiliary source of supply is available for pre-heating the rectifiers, and the circuit-breaker air reservoir is empty. Improvements introduced for this purpose include a modified rectifier water-cooling circuit, increased capacity of the pre-heater, and provision for accelerated pre-heating by operating the rectifiers on short-circuit at their lowest voltage when necessary.

The locomotive is rated continuously at 2,010 h.p., and on the one-hr. rating at 2,144 h.p., as against the continuous rating of 1,340 h.p. of the prototype. In spite of this, the weight in working order of 60 tons is only some 2 tons greater than that of the class "45."

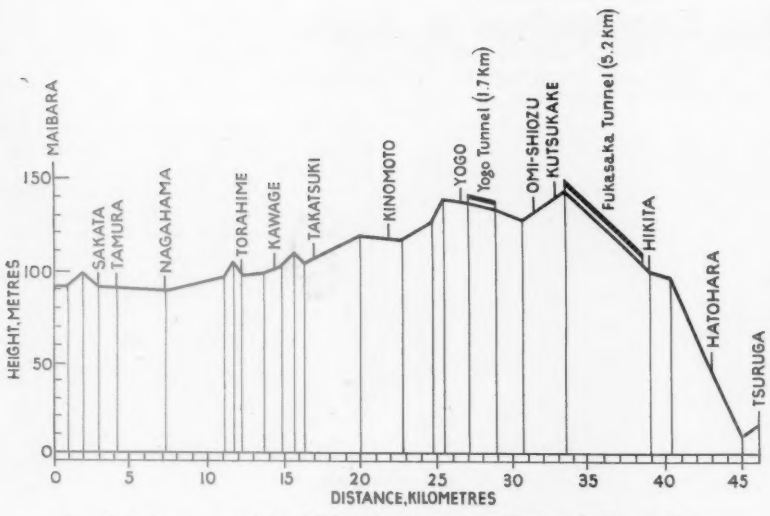
Equipment Layout

The electrical equipment is installed in central compartments between the two end cabs, with corridors on each side. A machine room at one end houses the traction motor blower, from which air is ducted to both bogies, and the d.c. generator, from which a 100-V. supply is derived for the electro-pneumatic contactor control equipment. This machine is driven by a 400-V. induction motor but other auxiliaries



1, 16. Control cabinet
2. Filter condenser
3. Blower for traction motors
4. D.c. generator
5. M.g. set motor
6. Blower for main transformer
7. Radiator
8. Main transformer
9. Distributing valve for airbrake
10. Unit switch contactor equipment
11. Ignition rectifier
12. Intercooler for ignition
13. Blower for intercooler
14. Filter resistor
15. Traction motor field diverter resistance
17. Hand brake
18. Low-voltage circuit-breakers
19. Pilot lamp
20. Instrument panel
21. Master controller
22. Brake valve
23. Pantograph
24. Line-voltage detection antenna
25. Pantograph isolator
26. Air-blast circuit-breaker
27. Lightning arrester
28. Main fuse
29. Air compressor
30. Battery

Diagram of Class "ED 70" locomotive for Hokuriku line



Profile of section of the Hokuriku line electrified with 60-cycle a.c.

are driven by 100-V. d.c. motors operated from the auxiliary supply. The next two compartments contain the main transformer and control contactors, which take the form of individual unit switches. Behind these is the rectifier compartment, in which the eight tubes are arranged in two transverse rows. In the final compartment are the blower for the ignitron cooling radiator (located next to the blower), a filter resistance, and the traction motor field diverter resistances.

Most of the equipment in the locomotive apparatus compartments is arranged in four independent blocks, comprising the main transformer and accessories, the ignitron unit, and two groups of contactors. Any of these can be removed independently through the roof and replaced by a new unit so that the locomotive need not be withdrawn from service. The compressor and battery are carried on the underframe.

The locomotive will exert a continuous tractive effort of 32,300 lb. at 22½ m.p.h., or a one-hr. effort of 35,270 lb. at 21¼ m.p.h. The traction motors are springborne in the bogies, and drive through spring disc transmissions.

In the first place, electric working on the Hokuriku line is being confined to the Tamura-Tsuruga section in order to avoid the problems of a junction between the high-voltage a.c. and the 1,500-V. d.c. systems at Maibara, on the Tokio-Osaka main line. Eventually, however, the a.c. overhead line will be extended to Maibara and the rectifier locomotives will be equipped for operating with limited power from the d.c. overhead line, primarily in order to carry out shunting movements there in connection with the changeover between a.c. and d.c. motive power. The present practice of using steam locomotives for hauling trains between Maibara and Tamura will then be discontinued and all traffic over the line will be worked by electric traction apart from the diesel railcar services between Maibara and Nakanogo. This will enable loads of 1,000 tons to be hauled, although with this weight of train double-heading will be required between Hikita and Tsuruga because of a gradient of 1 in 40 which extends for 1½ miles. When working on d.c., the a.c. locomotives will be able to haul a 500-ton passenger train up a gradient of 1 in 100 at 12½ m.p.h. or a 1,200-ton freight train on the level at 18½ m.p.h.

It is intended eventually to build a.c. multiple-unit sets, which will then take over the present diesel railcar services.

Principal characteristics of the locomotive are given below:—

Length overall	46 ft. 9 in.
Width	9 ft. 2 in.
Height above rail level (pantograph down)	13 ft. 7½ in.
Rigid wheelbase	7 ft. 10½ in.
Wheel dia.	3 ft. 8 in.
Weight in working order	60 tons
Traction motor ratings—	
Continuous (full field)	502 h.p. at 1,020 r.p.m., 710 A., 570 V.
One-hr. (full field)	536 h.p. at 1,000 r.p.m., 760 A., 570 V.

Traction Run-Curve Grapher

(*Concluded from page* 596)

Speed restrictions are dealt with in one of two ways. If the gradient is sufficient to maintain the speed when coasting, the acceleration wheel is disengaged when the desired speed is reached and operation is continued at that speed. If, however, the speed cannot be maintained, appropriate distances of alternate coasting and motoring are worked in as may be required.

The run is continued until the predrawn braking curve is met, when the counter reading is noted. The difference between the final and initial counter readings plus the braking time gives the run time.

In its simplest form the machine produces a chart which shows speed and time against distance, as shown in Fig. 2. From this chart much information can be gained for the designer of the traction equipment, and the use of two additional templates on the machine enables A.-sec. and A.^{2}-sec. to be obtained, and from these figures power consumption and root mean square currents can be calculated.

Another useful feature of the machine is the facility for comparing the performance of two or more different traction motors in the same operating conditions. The templates for the respective motor characteristics are simply changed to suit and the chart is then run through again from the starting point. For this purpose an alternative position for the timing trace is available.

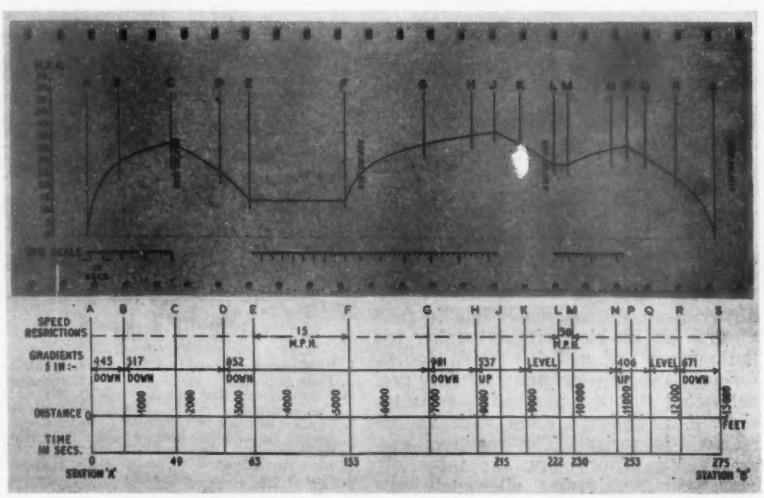


Fig. 2—Typical chart for proposed journey traced by the machine

Oil-Filled Cable in the Southern Region

Installation in London suburban area for change-of-frequency scheme

SOME 260 feeder-miles of 33-kV. three-core oil-filled cable have been laid in connection with the change of frequency scheme in the Southern Region of British Railways, as described in our issues of October 25 and November 8. At South Bermondsey, Lewisham, Nunhead, and Brockley, 66/33-kV. transformers are connected direct by 66-kV. oil-filled cable with the Central Electricity Authority Deptford power station. The other points of connection, which include Northfleet, Wimbledon, Leatherhead, and Croydon, are C.E.A. grid substations from which supply is given at 33 kV.

Manufacturing Procedure

All this oil-filled cable was manufactured at the Eastleigh Works of Pirelli-General Cable Works Limited; normal manufacturing lengths of three-core cable have been of the order of 550 yd. Among the improved facilities at this factory for the production and testing of oil-filled cables for the highest voltages yet used is the application of paper lapping by a specially designed machine operating in an air-conditioning enclosure. By this means the lapping is carried out under precisely controlled conditions of tension and registration, and since the moisture content of the paper is known, due allowance can be made for the shrinkage which occurs during drying. The result is a consistently high standard of insulation irrespective of outside atmospheric conditions during manufacture.

The lead sheathing is applied by a continuous lead extrusion machine, designed by Pirelli-General Cable Works, Limited, to overcome the drawbacks of a hydraulic press, and to ensure a sheath of uniform structure and consistent strength suitable for heavily-loaded cables operating under constantly-maintained pressure.

Cable-laying Operations

The cables have been jointed on site after laying, an operation demanding scrupulously clean and dry conditions. In Blackheath Tunnel, 1,681 yd. long, between Blackheath and Charlton on the North Kent line, the clearances were inadequate for the installation of joints and as this length of three-core cable could not be manufactured in one length, three continuous 1,725-yd. runs of single hollow-core cable were manufactured in extra large processing tanks at the Eastleigh Works. All three cables were laid in precast concrete troughing along the foot of the tunnel wall. In cables of this type the oil flows inside the hollow core of the conductor instead of through separate ducts as provided in the filler spaces of three-core cables.

For the most part the cable is laid at ground level in pre-cast concrete troughing made at the Southern Region concrete works at Exmouth Junction. In exceptionally difficult conditions, such as over bridges, on parapet walls, or where there is no room for troughing, it is carried in asbestos cement split-tubing supported by steel hangers. Thus the cable is continuously supported and protected from accidental damage by fires or other causes at the trackside. Duct lines under tracks are formed by asbestos cement conduits laid in concrete. Where suitable, the cable is laid direct in the ground and protected by reinforced concrete slabs.

The reinforced concrete troughing and cable covers and posts have been manufactured at the Exmouth Junction Works and unloaded and installed by Pirelli-General. At each substation the oil-filled cable is terminated in a stop joint and the connection to the switchgear is effected by the use of solid type cable.

Laying 33-kV oil-filled cable in concrete troughing

Oil Pressure Indicating System

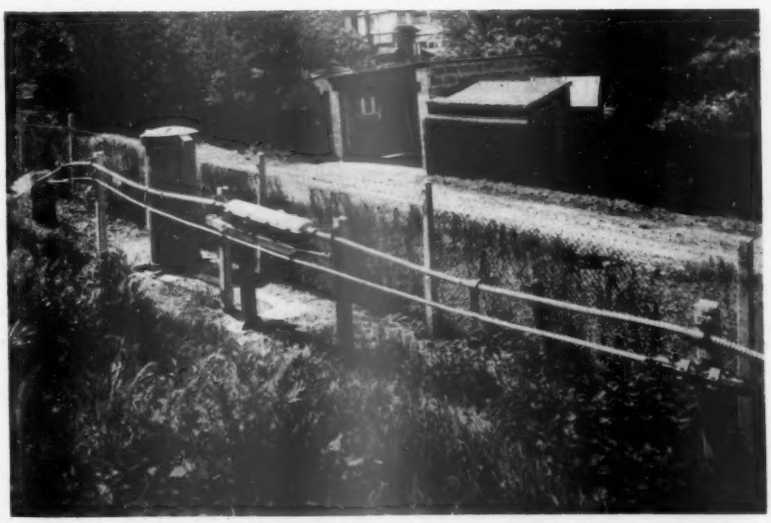
Provision is made throughout the system for detecting abnormal oil pressure conditions in the cables and for giving audible and visual alarms in the control rooms at Raynes Park, Lewisham, and Selhurst. This is done by the use of low oil pressure indicating switches. The latest design of this type of switch consists of a spring-loaded flexible bellows which is normally compressed by external oil-pressure, the oil container being connected to the oil system of the cable. Should the oil pressure fall to a predetermined value, the mercury switch is tripped and actuates an alarm. In some cases differential oil pressure indicating switches are used, which detect a difference in pressure between adjacent oil sections of the same feeder.

Pilot wires for these indications, circuits for remote supervisory control of the rectifier substations and track paralleling huts, also for telephones are carried in about 250 miles of pilot cables also supplied by Pirelli-General, and follow the feeder cable routes.

Corrugated Aluminium Sheathing

Between Wimbledon and St. Helier substations an experimental length of cable having a corrugated aluminium sheath was installed. This type of con-

(*Continued on page* 600)



Oil-filled cable with corrugated aluminium sheathing, cable joint, and reservoir on the Wimbledon-St. Helier section

Improvements to the Cape Eastern Main Line

New bridge constructed over the Orange River and new water plant installed at Bethulie

New Bethulie bridge, showing falsework supporting the shuttering

TWO large projects were brought into commission recently by the South African Railways on the Cape Eastern main line. The bridge over the Orange River at Bethulie, between Bloemfontein and Queenstown on the main line to East London, has been replaced by a new one, which was opened to traffic earlier this year, and a new plant to provide water for locomotives has been installed at Bethulie. The cost of the two projects, including the deviation of 3½ miles of railway track to connect the new bridge with the main line, amounted to about £338,000.

The old Bethulie bridge was built in 1890, and blown up during the 1899-1902 war, but was rebuilt while the war was still in progress. It carried 81 lb. track, but was too light for the heavier type of locomotive and other rolling stock now used by the South African Railways, and speed restrictions over the bridge had to be applied.

The new bridge, which is sited very near to the old one, is 1,156 ft. long with 16 68-ft. reinforced concrete deck spans, and was built under private contract by the Roberts Construction Company. The average height from stream-bed to rail level is 50 ft. and all the piers are founded on rock, while the two abutments are carried by concrete piles which are taken down to solid rock.

To make provision for expansion and contraction due to temperature changes, every second pier is split down the centre through the top 15 ft. The split is 1 in. wide and allows limited bend in the piers.

About 6,000 cu. yd. of concrete and solid rock. To provide for expansion 430 tons of steel were used, and the total cost of the work including the deviation of the tracks amounted to some £243,000.

Water Supply

The construction of a new water plant on the north bank of the Orange River, to replace the old plant which was situated at Holmgrove, an interloop about two miles from Bethulie Station, has solved the water problems on this section.

The normal muddiness of the water of the Orange River proved to be beyond the filtration capacity of the old plant, and it was not possible during the low-flow periods of the river to get the water to the pump intakes.

During dry periods the Orange River flows in channels in the river bed. When the new bridge was built, a curtain or cut-off wall was built down to the rock between the bridge piers. At one span, near the north bank, the height of the wall was reduced by 3 ft. to form a notched weir for low flows. The pump suctions were then placed at this point and even during exceptional droughts when the visible river flow is zero, the seepage flow in the sandy river bed will be sufficient to provide enough water to maintain the train services.

Two low lift pumps deliver the water into a pre-settlement unit of special design, developed by the South African Railways, into which the heavier silt portion of the water is dropped. The unit is flushed out periodically disposing of about 20 to 25 tons of silt per day when the river is in flood.

After going through the filtration plant the water is pumped to two 100,000 gal. storage reservoirs located on high ground above Bethulie Station. From this point water is gravitated to 20,000 gal. pressed steel tanks which feed the water columns from which the locomotives are supplied.

Oil-Filled Cable in the Southern Region

(*Concluded from page* 599)

struction results in several economies; for example, the rigidity of the sheath makes it unnecessary to incorporate spiral oil ducts and no reinforcement is required to resist radial oil pressure. A further consequence of the rigidity of the aluminium sheath is that fewer supports are needed when the cable is carried on lineside posts than when lead-sheathed. The corrugation of the sheathing affords greater flexibility than other types of aluminium-sheathed cable and thus facilitates bending of the cable on the drums and during installation.

Very careful planning has been necessary in connection with the installation work so that there should be minimum interruption of traffic. Some of the construction work could be carried out during daytime with a railway lookout man in attendance, but for the construction of duct lines under tracks, on bridges and wherever tracks had to be occupied by a construction or cable-laying train, complete possession had to be arranged, normal rail traffic being excluded. Under these conditions the majority of the cabling work had of necessity to be carried out at night and during weekends.

Installation work began in April, 1952. The average rate of production and laying of oil-filled and supervisory cable has been some 60 miles a year.

The site organisation consists of a central administration office and three separate section organisations dealing respectively with the Western, Central, and Eastern sections of the scheme, i.e. approximately one-third each of the total. The Central Administrative Office has acted as Pirelli-General's liaison with British Railways, and has also performed the work of co-ordinating the three section organisations.

GOOD SEASON FOR WINDERMERE STEAMERS.—*Swan, Swift, Teal* and *Tern*, the four British Railways vessels on Lake Windermere, carried nearly 500,000 passengers during the past summer season.

RAILWAY NEWS SECTION

PERSONAL

Mr. J. R. Pike, Chief Commercial Officer, British Railways Central Staff, British Transport Commission, is retiring at the end of this month, after over 43 years of service.

Mr. William Henry Hobbs, Vice-President of Personnel, Canadian National Railways, who is retiring after 44 years of railway service, has been closely associated with all departments and divisions of the C.N.R. and of its predecessor, the Grand Trunk Railway, on which he began his career. As Secretary to the late Sir Henry Thornton during Sir Henry's entire tenure as first President of the C.N.R., Mr. Hobbs had an intimate knowledge of the formative years of the present wide-spread system. Seven years ago he was made Vice-President to carry out management's policy of modernising the planning activities of the Personnel Department. He has since introduced numerous methods. Mr. Hobbs had intimate and general administrative experience under four Presidents. In 1914 he became Private Secretary to the President of the Grand Trunk and Grand Trunk Pacific Railways and subsequently served two other Presidents of those companies. He became Secretary of the company in 1935 after serving three years as Assistant Secretary. His jurisdiction in that position extended to the numerous subsidiary and affiliated companies of the railway including Trans-Canada Air Lines which was incorporated with the Canadian National Railways in 1937.

We regret that, in publishing Mr. T. P. Strafford's biography in our issue of November 8, we made an incorrect statement. Mr. Strafford joined the London & North Western Railway in October, 1919, and not the L.N.E.R., as stated. That system was not in existence at that date.

Commander A. F. Mellanby has been appointed Senior Marine Officer at Railway Headquarters, Nairobi, of the East African Railways & Harbours Administration.

Mr. William T. Wilson, who has been appointed Vice-President, Personnel, Canadian National Railways, is 52. He was born in Ottawa and educated at Ottawa Model School and Lisgar Collegiate. Before joining the railway in 1950 he was Deputy Chairman & Comptroller of the Wartime Prices & Trade Board. In earlier years he was Vice-President of the Commodity Prices Stabilisation Corporation, Director of the Canadian Sugar Stabilisation Corporation and, from 1933 to 1942, Vice-President of the Benzalene Corporation Limited. From 1944 to 1945 Mr. Wilson was Chief Treasury Officer of the National Housing Administration and later became Chief Treasury Officer in charge of establishing Family Allowances offices across Canada for the Department of National Health & Welfare. He assisted in the merging of the health branch of the Department of Pensions with the then new Department of National Health & Welfare. Mr. Wilson joined the C.N.R. as Special Assistant in the Personnel Department and became Director of Personnel in 1951. Since 1952 he has been Assistant Vice-President, Personnel.

Mr. W. H. Hobbs
Vice-President (Personnel), C.N.R., who is retiring

Mr. William T. Wilson
Appointed Vice-President (Personnel), Canadian National Railways

The funeral of Mr. Tom Hollywood, late President of the National Union of Railwaymen, whose death was recorded in our last week's issue, took place at Daldowie Crematorium, Lanarkshire, on November 15. Among the mourners were the Lord Provost of Glasgow, Mr. Andrew Hood; Sir John Benstead, Deputy Chairman of the British Transport Commission; Sir Ian Bolton, Chairman of the Scottish Area Board of the B.T.C.; Mr. W. P. Allen, Manpower Adviser, B.T.C.; Mr. James Ness, General Manager, Scottish Region, British Railways, and representatives of the trade union and Labour movements.

Dr. T. Matsudaira, Chief, Car Dynamics Laboratory, Railway Technical Research Institute, Japanese National Railways, has been visiting the U.K. this week and leaves today (November 22) for the Continent, whence he will return direct to Japan. Dr. Matsudaira has been studying passenger coach suspension on British Railways while in this country.

Mr. Reginald F. Hanks has joined the board of Parkinson & Cowan Limited.

Mr. I. M. Campbell

Appointed District Engineer, Kings Cross, Eastern Region

Mr. J. J. Leenane

Passenger Assistant to General Agent, Dublin, British Railways, 1953-57

The late Mr. Trevor Roberts

Divisional Superintendent, Newport, G.W.R., 1924-42

Mr. I. M. Campbell, B.Sc. (Eng.), A.M.I.C.E., who, as recorded in our November 1 issue, has been appointed District Engineer, Kings Cross, Eastern Region, British Railways, graduated at University College, London, in 1942, subsequently joining the former London Midland & Scottish Railway as a draughtsman in the District Engineer's office at Watford. He relinquished this position in January, 1943, to join the Royal Air Force in which, after a short period, he was commissioned, attaining the rank of Squadron Leader. He was mentioned in despatches. Mr. Campbell returned to railway service in 1947 and occupied a number of positions in the Permanent Way and New Works offices of the North Eastern Region at York. In 1950, he transferred to the Bridge Office, Euston, and, the following year, he obtained an award for the study of Management and Production Technology in the United States. He spent the following 12 months at the University of Illinois and attached to various American railway companies. Soon after his return he was appointed Personal Assistant to the Chief Civil Engineer and, in May, 1954, became Assistant District Engineer, Eastern Region, Sheffield, the position which he vacates to take up his new appointment.

Earlier this year Mr. L. C. Hawkins, a full-time Member of the London Transport Executive, led a mission to Colombo to advise on the re-organisation of the island's bus services. Further assistance in this matter is now to be given and Mr. R. G. Hills, Divisional Engineer in the department of the Chief Mechanical Engineer (Road Services) and Mr. W. P. Morgan, Divisional Superintendent in the department of the Operating Manager (Country Buses & Coaches) will leave this country for Ceylon by air on November 26. Mr. R. G. Hills was one of the team of three which visited Ceylon earlier in the year. While in Ceylon, Mr. Hills and Mr. Morgan will act as advisers to the newly-formed Ceylon Transport Board on matters referred to them by the Board. They will not have any executive responsibility for the actual transfer of existing bus undertakings to the Board, or for the maintenance and operation of bus services after they have been acquired.

Mr. J. J. Leenane, Passenger Assistant to the General Agent, Dublin, British Railways, who, is retiring after 49 years of service, joined the railways in 1908. He was appointed Passenger Agent, Kingston Pier, in 1919, and returned to North Wall in 1929 as Chief Outstandings Clerk, subsequently holding the positions of Chief Claims Clerk (1941) and Chief Passenger Clerk (1946). He has been Passenger Assistant since 1953. Apart from his railway activities Mr. Leenane is a keen member of the Skal Club and also of the Safety First Association of Ireland.

Mr. C. P. Millard, District Goods Manager, Warrington, London Midland Region, British Railways, has been appointed Assistant Divisional Traffic Manager, Manchester.

Mr. W. E. Grainger, District Motive Power Superintendent, Springs Branch, Wigan, London Midland Region, British Railways, has been appointed Assistant Divisional Traffic Manager, Barrow.

We regret to record the death on November 1, at the age of 71, of Mr. H. H. Cressall, founder of the Cressall Manufacturing Company (acquired in 1955 by the Expanded Metal Co. Ltd.) and the pioneer of manufacture in this country of asbestos woven resistance nets.

Mr. E. Halder, Dock Superintendent, Middlesbrough, British Transport Commission, is retiring on December 31 this year.

Mr. R. Ellis, General Manager of British United Traction Limited, left this country on November 16 for a tour of South, Central, and East Africa. He will discuss rail traction developments with railway officials in these various countries and will inspect area agents.

We regret to record the death, on November 12, of Mr. Neil C. McPherson, O.B.E., who relinquished his appointment as Divisional Manager, North Eastern Division, British Road Services, at the end of 1955 because of ill health. Mr. McPherson founded the road transport business of Venn & McPherson in 1919.

We regret to record the death on November 17, at the age of 60, of Mr. Trevor Roberts, Divisional Superintendent, Newport, Great Western Railway, 1924-42. Mr. Roberts was born at Malpas, Monmouthshire, and educated at Christ College, Brecon. He joined the Great Western Railway in the Divisional Engineer's Office at Newport in 1894 and was apprenticed at Swindon. Ten years later he was transferred to the staff of the Superintendent of the Line and, after some six years during which he was mainly engaged with the working of freight trains all over the system, he was in 1910 transferred to Swansea as Outdoor Assistant to the Divisional Superintendent. Mr. Roberts held that position until 1921, when he went to Cardiff as Assistant Divisional Superintendent; he became Divisional Superintendent at Pontypool Road in May, 1922, and was appointed Superintendent of the then newly-formed Newport Division in 1924.

Mr. B. R. English, Assistant (Rents Revision), Estate & Rating Surveyor's Department, Victoria, Southern Region, British Railways, has been appointed District Estate Surveyor (Western), Victoria, with effect from November 4, 1957.

Mr. D. F. Ringe, formerly Chief Designer of Vokes Limited, has been appointed General Manager, and Mr. K. D. Mulcaster, formerly Chief Draughtsman, becomes Chief Designer, of that company.

Mr. J. M. Robb, Manager of the Overseas Division of Expandite Limited, will leave this country on November 10 for a tour of Switzerland and Italy.

Mr. W. B. Sallitt has been appointed Personal Assistant to the Managing Director of the Superheater Co. Ltd.

Mr. Miles Beevor has joined the board of Rubery Owen & Co. Ltd., the parent company of the E. Owen Organisation.

Mr. D. J. Keily, Acting Works Director, Sahaganj, India, for the Dunlop Rubber Co. Ltd., has been appointed Works Director of the company's factory at Kobe in Japan. The appointment is effective from January 1.

Diesel Maintenance Depot at Crewe

Facilities for examining and servicing units allocated to the Crewe Motive Power District

The first entirely new Motive Power Department diesel maintenance depot built by the London Midland Region is now nearing completion.

The new depot, at Crewe, will provide facilities of the most modern standard for the maintenance, examination, and servicing of diesel units which are, or will be in the near future, allocated to the Crewe Motive Power District. These comprise diesel locomotives for both main-line and shunting duties and also multiple-unit diesel trains. The depot will also be a concentration point for maintenance work on diesel units from adjoining districts.

Sited between the passenger and goods lines south-west of Crewe station, the depot contains five 270-ft. through roads and five short roads, each 80 ft. long. The shed is 141 ft. wide and contains all the modern plant, machinery, and power tools necessary for the running maintenance of diesel locomotives. All roads inside the shed are provided with inspection pits specially designed for work on diesel locomotives and fitted with fluorescent lighting for the whole of their length. There is pit capacity for 17 locomotives at any one time. Work above rail level is facilitated by light movable platforms for use by repair staff and is illuminated by powerful overhead lighting. The concrete floor of the shed is treated with a special dust preventative solution.

There are pits on all outside roads at the north (incoming) end of the shed and these will be used, among other things, for the washing-down and cleaning of the units before they enter the depot.

Testing Roads

Three of the short roads inside the south end of the shed will be used for the testing of main-line diesel locomotives. The other two short roads are at the north end and are for the maintenance of the diesel shunting locomotives which have been based at Crewe South Motive Power Depot for several years and have hitherto been maintained at this steam depot. This part of the new depot is already in use.

There is accommodation for a total of 100 staff with a peak of 80 on duty at any one time. Messroom, lavatory, and washing facilities and locker rooms are provided and there are offices for a Supervisory Mechanical Foreman and a clerk.

The whole building is heated from oil-fired boilers. Unit heaters are used in the workshop area. There is a general store fitted with racking and opening off the main store are a lock-up store, a tool store, and the storekeeper's office. A two-ton electrically-operated hoist block has been installed for unloading heavy stores from wagons placed at a dock alongside the stores.

Fuel Installation

A standard 14,000-gal. fuel installation is provided which supplies three fuelling points. The plant will deliver fuel at the rate of 4,000 gal. per hour. Provision has been made for fume extraction from the building, particularly in connection with the trichlorethylene degreasing machine installed.

Oil storage tanks are provided for engine sump oil, exhauster lubricating oil, compressor lubricating oil, and axlebox oil for main-line locomotives. Other tanks contain engine sump oil and general lubrication oil for diesel shunters. Multiple-unit railcars are supplied with engine sump oil, final-drive oil, and gearbox oil from separate tanks. A storage tank is also provided for used lubricating oil.

Suitable electric lighting and power points are provided throughout the depot. There are also battery-charging facilities suitable for all types of diesel power units. Water supply points are provided throughout the depot.

Among the machines installed at the depot are a sensitive drill and radial drill; rough and smooth grinding machines; a 12-in. gap lathe and a 9½-in. lathe; white-metalling and coppersmiths' hearths; an Elin electric welding plant; an Atlas wheel profile turning machine for re-profiling tyres with wheels in position. This machine will be able to deal with wheels up to 54 in. dia. It is likely to be utilised for tyre profiling on multiple-units as well as locomotives, and also for carrying out such work for other neighbouring motive power districts where the provision of an additional machine is not justified. The main contractor is Leonard Fairclough Limited, Adlington, Lancs.

Revised Numbering of British Railways Diesel Locomotives

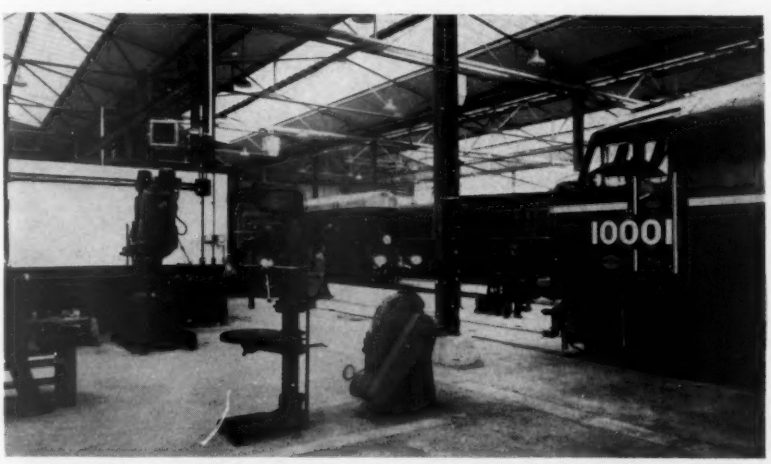
The decision to adopt a numbering system for all British Railways diesel locomotives, involving the use of the prefix D for all such locomotives, followed by a number which would not only identify the locomotive, but would also indicate its power range, was detailed in our issue of June 21.

It has now been decided to develop this system of numbering in order to cover additional types of main-line diesels and the planned increase in the numbers of 200-h.p. diesel shunting locomotives. The British Transport Commission has announced a scheme of numbers, in which the provisional system of indicating power range of main-line diesel locomotives, by Type-letters "A," "B" or "C," is being superseded by Type-designations "1" to "5," in ascending order of power. Details of the scheme are as follow:—

The revised numbers do not affect in any way the numbers already announced for the main-line locomotives currently on order, nor do they involve the re-numbering of the 350-h.p. diesel-electric shunting locomotives.

Diesel shunting locomotives in the 150 to 300-h.p. range are, however, to be re-numbered. Blocks of numbers have been allocated to the various manufacturers' locomotives so that the individual numbers will provide closer identification than hitherto. Existing locomotives will be re-numbered as they enter the works for repairs.

Locomotive type	H.p. range	Previous type designation	Original numbering scheme	New numbering scheme
Main-line type "4"	2,000–2,500	C	D.1–D.2499	D.1–D.999
Main-line type "5"	3,000	—	—	D.1000–D.1999
Shunting	150–300	—	D 2500–D.2999	D.2000–D.2999
"	350	—	D.3000–D.4999	D.3000–D.4999
Main-line type "2"	1,000–1,250	B	D.5000–D.7999	D.5000–D.6499
Main-line type "3"	1,500–1,750	—	—	D.6500–D.7999
Main-line type "1"	750–1,000	A	D.8000–D.8999	D.8000–D.8999
Miscellaneous	—	—	—	D.9000–D.9999



A corner of the machine shop, showing a 3-ft. 6-in. radial arm drill by Kitchen & Wade Limited, a sensitive drill by B. Elliott & Co. Ltd., and a 20-in. wet tool grinding machine by F. E. Rowlands & Co. Ltd.

CALEDONIAN STEAM PACKET CO. LTD., SAILINGS.—During the year ended October 6, 1957, 4,331,161 passengers and 65,052 vehicles were carried by the Caledonian Steam Packet Co. Ltd. Compared with the previous year, there was an increase of 204,900 passengers and 5,248 vehicles.

NEW EQUIPMENT AND PROCESSES

Fuel Pump Coupling Disc

THE Nylastic fuel pump coupling disc has been developed to overcome the problem of fatigue caused by the pulsations of the modern diesel fuel injection pump. At the same time, it provides a surface which offers maximum resistance to wear.

The high abrasion resistance of Nylastic with the strength imparted by the outer metal shrouding and inner metal ring are stated to meet the requirements satisfactorily. A feature is the minute amount of angular deflection which occurs in the coupling during operation, providing a resilience which tends to damp the shock loading.

The coupling disc is larger in diameter than the conventional type since this design caters also for a maximum of 0.05 in. parallel misalignment between the driving and driven shafts without the outer metal shrouding being fouled. It has an outside dia. of 3.30 in. and is 0.52-in. thick.

The disc will fit C.A.V., Bryce Berger, and the earlier Simms fuel injection pumps, and is unaffected by fuel oil, petrol, lubricating oil, paraffin, and so on, and is capable of operating up to temperatures of 230° F. without any serious fall-off in physical characteristics. Having a relatively low co-efficient of friction, Nylastic forms a smooth, silent bearing, and allows foreign bodies to embed themselves, thus reducing wear of the bearing surfaces.

The Nylastic coupling disc is being manufactured by Howard Clayton-Wright Limited, Wellesbourne, Warks, from which full details can be obtained.

Compact Multi-Range Meter

THE Multiminor, which has been produced to meet the need for a compact multi-range meter, is stated to be the first of its type. It is being manufactured in two versions, Model 1 for use in temperate climates, and Model 2 for use in adverse climatic conditions.

All suitable components have been made on precision moulding presses, the pan-climatic version, using a recently developed moulding powder, which endows the finished product with a very high factor of electrical insulation, even when working under conditions of extreme humidity; moreover, this material resists the growth of fungus. The indicating movement has been neatly constructed in a dust-proof casing, and all wiring is termite proof.

The instrument is fitted with a special selector switch which is similar to that incorporated in the manufacturer's more expensive Avometer. A feature of the unit is the use of printed resistors, produced from a special metallic alloy. High stability carbon resistors have also been employed wherever necessary.

The instrument has 19 ranges, selection being by the rotary switch mentioned above: only two connection sockets are necessary for all measurements. A simple scale is provided for current and voltage measurements, and another for resistance measurements.

The unit has sensitivities of 10,000 Ω /V., on all d.c., and 1,000 Ω /V. on all a.c. ranges. Resistance measurement ranges of 0-20 k. Ω and 0-2 m. Ω are provided.

D.c. voltage ranges are from 0-100 mV. to 0-1,000 V.; a.c. ranges are 0-10 V. to 0-1,000 V.; d.c. current ranges being from 0-100 μ A. to 0-1 A.

The overall size is 5⅝ in. × 3⅝ in. × 1⅝ in.; and it weighs 1 lb. approximately. An ever-ready leather case can also be supplied for protection of the instrument.

Further details, including price and delivery, can be obtained from the manufacturer, Avo Limited, 92-96, Vauxhall Bridge Road, London, S.W.1.

High Temperature Refractory Concrete

A REFRACTORY concrete, Conkos No. 1, described as super-duty castable pre-mix, is stated to be the first product of its type to be commercially available with a working temperature of 1,800° C. (3,300° F.). Of application to electric furnaces of all kinds, furnace linings, and so on, the product has a high resistance to spalling, chemical attack, thermal shock, and slag and scale.

The main feature of Conkos No. 1, apart from the high working temperature, is its high chemical purity with an alumina content of 96 per cent.

The price of the product is £7 7s. per cwt., or £140 per ton; delivery is ex stock. Particulars can be obtained from the manufacturer, Purimachos Limited, Bristol 2.

Diesel Fuel Pump Test Bench

A COMPACT floor-mounted test bench for servicing diesel injection pumps, governors and lift pumps has been developed. The Junior, as it is known, is suitable for the majority of base- or flange-mounted inline pumps up to six-cylinder, including the equipment used on British Railways diesel railcars. The test bench incorporates the manufacturer's overflow calibration system, and speed range of 100 to 2,000 r.p.m., together with other features of the larger equipments.

The machine is of all-steel welded construction. Power is provided by a 1½-h.p. three-phase a.c. motor; all main power shafts run in self-lubricating bearings. A detachable drip tray permits clean working conditions. The overflow calibration system is stated to allow extreme accuracy measuring small outputs. Each of the six balanced test injectors are immersed in a sealed container fitted with an output pipe direct to each calibrated test tube. The six test injectors are carried in a special injector mount having two positions on the test bench. This permits short pipe connections between pump and injector, essential for accuracy in calibration.

A selective infinitely variable speed between 100 and 2,000 r.p.m. can be obtained: pumps can run at any selected test speed for indefinite periods without the slightest variation. A 360-deg. ring and pointer is prominently fitted which is combined with a 3:1 reduction for ease and accuracy

when spill phasing. A lever actuating the motor frame quickly brings a pressure pump into circuit for pressure phasing and positive fuel supply.

An instantaneous 100 shot trip mechanism is operated from either side of the machine, giving fast calibration. Pump concentricity is ensured by spigoted pump mounting brackets and interchangeable drive couplings. Various types are available for a wide range of standard pumps and also for the new distributor type pump.

The price of the Junior test bench is £198 10s.; attachments are extra. Further details, including delivery, may be obtained from the manufacturer, Leslie Hartridge Limited, 9, Victoria Street, London, S.W.1.

Universal Bridge Test Instrument

THE type TF 868A Universal Bridge is a version of the manufacturer's type 868/1; an improvement is the incorporation of a bridge-volts monitoring system. The instrument has railway applications such as for testing components of electrical signalling systems, marshalling yard v.h.f. radio telephone equipment, and so on.

For inductance or capacitance measurements, the measuring bridge is energised by an a.c. voltage derived from a valve oscillator. If desired, this voltage can be set to a definite required value. For this purpose there is a continuously variable L. & C. bridge volts control, a 0- to 10-V. auxiliary scale on the panel meter, and a Read L. & C. bridge volts switch. The inclusion of this new facility is stated to be especially useful when measurements are being made on components such as iron-cored coils whose inductance is a function of exciting current.

The bridge measures values of inductance from 1 μH. to 100 H., capacitance from 1 $\mu\mu$F. to 100 μF. and resistance from 0·1 Ω to 10 MΩ. Inductance or capacitance measurements can be made at either 1 or 10 kcs.; resistance measurements are made at d.c. The instrument combines bridge networks, precision standards, a.c. and d.c. bridge supplies, an amplifier-detector for a.c. balance determination, and a centre-zero galvanometer for d.c.

The type TF 868A universal bridge is manufactured by Marconi Instruments Limited, St. Albans, Herts.

Perspective Drawing Apparatus

A DEVICE which facilitates production of perspective drawings from normal engineering projections, known as the Autoperspect Apparatus is now available in this country. The drawings produced by the device are produced by a fully automatic method.

The apparatus permits a choice of angle of view, scale of reproduction, and a selection of one-, two-, or three-point perspectives using only a plan and elevation drawing of the object.

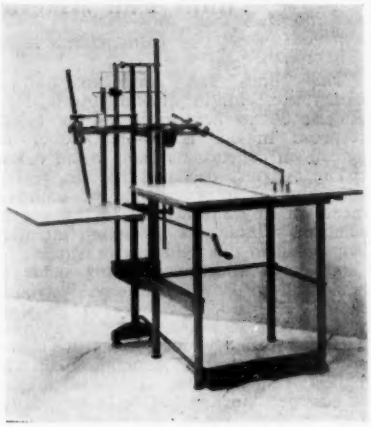
The illustration shows that it consists basically of a table on supporting legs, at the rear of which is the main frame supporting a smaller table, a vertical table (which is made of perspex and is not visible on the photograph) and also a linkage which connects the scriber arm with the pencil bar and transmits a congruent movement between them.

Apart from the fact that there is no possibility of error, a time-saving factor over normal methods of from 300 to 900 per cent, is also claimed. It being possible to draw any kind of perspective from any angle of view including cut-away views, exploded views, stereoscopic views, and topographical details.

The Autoperspect is being manufactured and marketed in this country by Autoperspective Limited, 5, Victoria Street, London, S.W.1, from whom all relevant details can be obtained.

Protection from Dry Rot

THE ability to provide protection against dry rot fungus for wood, brick or plaster work is claimed for Nuodex 87. This is a clear amber liquid concentrate which is brushed on to the wall surfaces.



The mildew growth, even of heavily infected areas, can be checked and prevented, it is stated, by suitable concentrations of the liquid. The product can also be used for general cleaning and sterilising in areas particularly susceptible to fungus growth.

Nuodex 87 is completely soluble in water, ethyl or isopropyl alcohol, mineral spirits, and Xylol and similar solvents. On evaporation it leaves a colourless residual film which, in the presence of the moisture needed for bacterial or fungus growth, is a powerful bactericide and fungicide, with a phenol coefficient of approximately 2·5. In spite of its ready miscibility with water, once applied and dried, Nuodex 87 is resistant to aqueous leaching.

Aqueous solutions of Nuodex 87 are detergent and have a definite cleansing action, as well as giving the thorough penetration of all crevices essential for satisfactory sterilisation. It is non-irritant to the skin. It has no adverse effect on the rate of drying, adhesion or durability of paint films applied over it, and is completely stable at normal temperatures.

Further details can be obtained from Nuodex Limited, Birtley, Co. Durham.

Ninth Pan American Railway Congress

Conclusions reached at Buenos Aires

The Ninth Pan American Railway Congress, held in Buenos Aires from August 30 to September 13, as briefly recorded in our issue of October 18, agreed on conclusions summarised below.

The congress declared that the perfect execution of a programme of improvements in any railway system cannot be achieved without the maximum attention being paid to the following principles:

(*a*) When selection is being made of new railway personnel, special attention should be paid, not only to physical, mental, and moral qualities, but to future potential capacity insofar as it affects promotion and the assumption of the highest responsibility. (*b*) Examination of new personnel should be in accordance with modern usage, including tests of mental and physical capacity and the investigation of personality, social behaviour and any other requisite which may be necessary. (*c*) Maintain complete training courses for staff in connection with their duties so as to ensure their progress, including the granting of special awards and scholarships to countries where advanced techniques are employed. (*d*) Creation of schemes for recompensating those of the staff who show diligence and application to their work. (*e*) Recommend the creation of courses of specialisation and study to familiarise the staff with the most modern techniques, and the utmost intensification of all suitable methods of study in universities, colleges, and technical schools, so that a supply of competent men is always available to enter railway service. (*f*) Maintain in all work centres conditions of safety, hygiene and social welfare which will guarantee the wellbeing of employees and their families. (*g*) Obtain recognition by all members of railway staff, be they workmen or high officials, of the fundamental principle that, where promotion is concerned, special consideration must be given to capacity and preparation for the post to be filled, without ignoring the services already rendered by the candidate. Only in this way would the railways, which form an integral part of the economic structure of a nation, achieve the maximum efficiency.

Permanent Committee Report

The permanent committee reported that since the fourth South American Railway Congress held in Bogotá in 1941, the difficulties caused by differences in technical terms used for the same unit of equipment in different parts of the American continent had been studied by committees specially appointed, which had consulted the various national committees, railways, and institutions. It was decided to study the matter under the following heads. (*a*) Way and Works, and Layout. (*b*) Traction, Material and Transport. (*c*) Operation. (*d*) Administration and Legal Matters.

This work was continued in the fifth congress at Montevideo in 1946 and the sixth congress at La Habana in 1948. A special committee based on Buenos Aires took over the work, and at the eighth congress at Washington in 1953, Dr. W. S. H. Stevens, Director of the Economic & Transport Statistics Office of the Interstate Commerce Committee (I.C.C.) presented an exhaustive study of the methods to be followed, dividing the subject matter as follows: (*a*) Way and Works, (*b*) Traction and Rolling Stock, (*c*) Traffic and Operation, (*d*) Accounting and Statistics, (*e*) Staff and Labour.

A special sub-committee of the permanent committee concluded that a complete agreement would not be possible at the present time, but suggested that the following measures should be taken: The appointment of a special permanent committee in each country, to compile the technical terms used therein with a complete description of each one, bearing in mind the work being carried out by the U.I.C.; the resultant list to be circulated amongst all members through the permanent committee of the P.R.C.; the appointment of a special permanent committee to co-ordinate the work of the corresponding national committees, and to submit its conclusions to future congresses; and recommend the utilisation of the approved technical terms, especially in papers and communications which are circulated in more than one country.

Modernisation of Steam Traction

A paper on steam traction presented by Mr. Porfirio Becarril of Mexico was approved unanimously. The gist of it was that in the American Republics a large number of steam locomotives were still in service and were capable of being modernised to increase their efficiency. The possibilities of steam traction were far from being exhausted, especially under favourable conditions, as had been proved in France and other parts of the world. Recommendations were that attention should be paid to the modernisation of steam locomotives. Technical investigation should be encouraged in the following cases: conventional steam locomotives improved according to modern techniques; special experimental types of locomotives such as atomic-powered units; and locomotives capable of using low-grade fuel.

Two British papers recommended for publication were entitled "Relationship between Railway and Civil Air Services," by Mr. C. E. R. Sherington, Director of Research Information Division, British Transport Commission, and "Tonnage Rating of Diesel Power," by Mr. J. Campbell of North British Locomotive Co. Ltd.

A communication from Mr. Jesus Lozada, Bolivia, on organisation of railways was the subject of a prolonged debate, and the conclusions arrived at by the author were modified as follows: (*a*) Recommend that state-owned railways should be run under basic contractual and operating directives. (*b*) Recommend co-operation between governments in order to arrive at technical and financial agreements for construction and operation of new lines (e.g. Yacuiba-Santa Cruz de la Sierra line.) (*c*) Recommend the formation of a body for the interchange of technical information and consultation, including training of technicians with the co-operation of the railway administrations and Continental States, which should provide the necessary funds. (*d*) Recommend that the I.E.S.C. endeavour to obtain recognition of the importance of railway transport in the general economic structure of all countries.

The committee studying papers in section E presented a motion recommending that a railway should be constructed between Santa Cruz de la Sierra (Bolivia) and a river port on the navigable reaches of the upper Amazon. This would complement the Yacuiba-Santa Cruz and Corumbá-Santa Cruz lines and would be of continental significance.

Type "2" Diesel Locomotive in Service in the Eastern Region

The first main-line diesel to be delivered to the Eastern Region, No. D.5500, *built by Brush Traction Limited, at Liverpool Street on November* 13, *on its first booked passenger train.*

Type "1" B.T.H. Diesel Handed over to British Railways

The first Type "1" 800-h.p. diesel-electric locomotive, with British Thomson-Houston electrical and Davey, Paxman engine equipment, was handed over to the London Midland Region last Tuesday at Euston Station. The locomotive, number D. 8200, was formally handed over by Lord Chandos, Chairman of the British Thomson-Houston Co. Ltd., to Lord Rusholme, Member of the British Transport Commission and Chairman of the London Midland Area Board.

In his speech, Lord Rusholme spoke of what had been a "trickle of new equipment required for the modernisation plan," now "swelling into a stream." The locomotive was an encouraging sign of the Plan taking material form, and of progress towards the ultimate aim of "providing Britain with a railway system which is once more the world's best."

The locomotive is described on another page and is also the subject of editorial comment.

Those who attended the ceremony or who had signified their intention of being present included the following:—

Members of B.T.C.: Lord Rusholme, Chairman, London Midland Area Board; Sir J. Landale Train, Mr. J. W. Watkins;

B.T.C. General Staff: Messrs. C. Barman, Executive Member, Design Panel; J. Barnes, Design Consultant (Allen-Bowden Limited, Consultant Designers for B.T.C. Design Panel); J. H. Brebner, Public Relations Adviser; D. S. M. Barrie, Chief Public Relations Officer; T. H. Hollingsworth, Traffic Adviser; J. Ratter, Technical Adviser;

B.R. Central Staff: Messrs. R. C. Bond, Chief Mechanical Engineer; R. F. Harvey, Chief Operating & Motive Power Officer; S. B. Warder, Chief Electrical Engineer; J. A. Broughall, Electrical Engineer (Development); E. S. Cox, Mechanical Engineer (Development);

London Midland Region: Messrs. David Blee, General Manager; L. M. Sayers, Assistant General Manager; J. F. Harrison, Chief Mechanical & Electrical Engineer; S. T. Clayton, Motive Power Superintendent; S. H. Gould, Operating Officer; R. W. Crawshaw, Public Relations & Publicity Officer; B. Adkinson, Assistant Motive Power Superintendent;

Eastern Region: Mr. K. J. Cook, Chief Mechanical & Electrical Engineer;

North Eastern Region: Mr. M. G. Burrows, Chief Mechanical & Electrical Engineer (Designate);

Southern Region: Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer;

Western Region: Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer;

Messrs. Merz & McLellan: Mr. H. H. C. Barton, Head of Traction Department;

Crown Agents for Oversea Governments & Administrations: Mr. D. C. Brown, Chief Mechanical Engineer;

New South Wales Government Railways: Mr. A. L. Fielding, Chief Resident Engineer;

East African Railways & Harbours: Mr. J. C. Grant, Electrical Engineer;

Westinghouse Brake & Signal Co. Ltd.: Mr. R. B. Hogben, Chief Commercial Engineer;

High Commissioner of South Africa: Mr. W. H. Maas, Advisory Engineer;

New Zealand Government Railways: Mr. R. F. Marriott, Railway Advisory Engineer;

Serck Radiators Limited: Mr. H. E. Upton;

A.E.I. Limited: Mr. G. E. Walker, Secretary;

The United Steel Companies Limited: Mr. H. A. A. While, London Manager;

British Thomson-Houston Co. Ltd.: Lord Chandos, Chairman; Messrs. E. H. Ball, Managing Director; W. S. Steel, Director & General Sales Manager; L. Drucquer, Director & Home Sales Manager; J. L. Dixon, Manager, London District Office; W. B. G. Collis, Manager, Traction Department; C. H. Chaplain, Manager, Publicity Department;

British Thomson-Houston Export Co. Ltd.: Messrs. E. V. Small, Managing Director; A. W. Barford, Manager, Eastern Sales; W. C. Scott, Manager, Western Sales;

Clayton Equipment Co. Ltd.: Sir James Reid Young, Chairman; Messrs. S. R. Devlin, Managing Director; W. Grainger, Director; J. Mayer, Director;

Davey, Paxman & Co. Ltd.: Messrs. G. W. Bone, Managing Director; J. P. Elliott, Secretary Director; A. G. Howe, Engineering Director; L. L. Bott, Works Director; D. M. Pearce, Chief Engineer; T. H. Minta, Sales Manager; F. W. Martin, Works Manager; H. P. Brown, Asst. Commercial Manager (Engines);

Yorkshire Engine Co. Ltd.: Messrs. E. R. S. Watkin, Director; J. N. Compton, Technical Director.

London Midland Region Passenger Service Alterations

Several alterations of note have been made to the winter train services of the London Midland Region since the publication of the winter timetables.

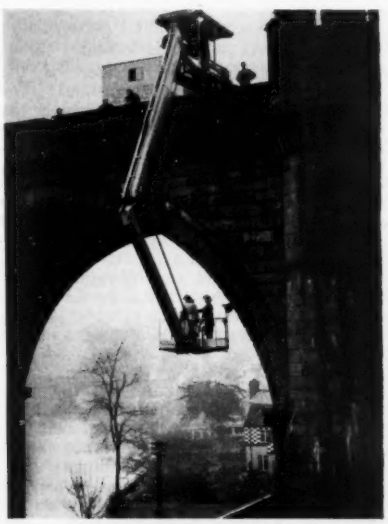
The winter book shows all local trains withdrawn from stations between Stockport and Manchester London Road after the 8.49 a.m. from Stockport, except for evening trains at 4.40, 5.7, and 5.21 p.m., and in the opposite direction after the 8.50 a.m. from Manchester Mayfield, except for the 12.20 and 12.50 p.m. from London Road on weekdays, three mid-day trains on Saturdays, and six evening trains between 4.5 and 6.30 p.m.

Now, however, the hourly diesel trains from Manchester London Road to Macclesfield and Buxton have all been altered to call at Longsight, Levenshulme, Heaton Moor and Heaton Norris, and similarly in the reverse direction, so providing a half-hourly service to each of these stations, with a deceleration of 7 min. on their through runs. Diesel trains between Manchester and Wilmslow via Styal also call in addition at Longsight. Stations between Manchester and Stockport thus enjoy a far better service than ever previously, continued in the evening until the 10.50 p.m. from London Road (11.20 p.m. on Saturdays). All diesel trains on the Birmingham-Lichfield

Rail-Mounted Viaduct Inspection Unit

(*See last week's issue*)

Inspection unit on Knaresborough Viaduct, North Eastern Region, with the twin booms stowed on bogie bolster wagon



Inspection platform in position below viaduct arch

service now call additionally at Butlers Lane, a new station between Four Oaks and Blake Street. The Midland Division service between Buxton and Millers Dale, connecting at the latter with main line trains between Derby and Manchester, has been taken over by diesel units.

"Midday Scot"

On the Western Division main line the reversion of the up "Midday Scot" from its 3 p.m. departure from Glasgow Central back to the previous 1.30 p.m. has necessitated an alteration to the 5.5 p.m. from Blackpool Central to Euston, which is held at Crewe from 7.25 to 7.48 p.m. in order to provide a departure for Euston at the time shown in the timetables for the "Midday Scot." The Blackpool train no longer requires to be held at Stafford for 16 min. in order to be passed by the "Midday Scot," however, and is only 2 min. later than before from Stafford to Euston, arriving at 11.10 p.m. The fast diesel railcar service at 11.15 a.m. from Crewe to Llandudno, which is booked over the 26½ miles from Chester to Llandudno in 26 min. start to stop, is further expedited by the omission of the Abergele and Deganwy stops and reaches Llandudno at 12.55 p.m., and even though a 39 min. wait at Crewe is involved, thus provides a 5-hr. service from Euston to Llandudno in connection with the 7.55 a.m. down "Lancastrian."

Parliamentary Notes

Capital for Nationalised Industries

Mr. Julian Ridsdale (Harwich—C. & L.) asked, in debate in the House of Commons on November 12, whether the last word had been said about financing nationalised industries. He considered that the Government should devise a scheme as urgently as possible to see that investment in the nationalised industries was on a voluntary basis of saving from outside. Who were the people who found the capital for the American, Argentine, and Chilean railways? They were the private British citizens. If the nationalised industries were put on a proper business basis they would attract foreign capital in the same way as did many industries in the private sector of the economy.

B.T.C. Wages Dilemma

Mr. Hugh Gaitskell, Leader of the Opposition, in the economic debate on the address of November 12, examined the implication of the Government anti-inflationary policy against wage demands. "The Minister of Transport," he said, "himself has said that it is extremely unlikely that there is any way out by way of higher wages—that would not help, it would lead to reduced traffic. The Government is, therefore, saying to the Commission, 'if you get an arbitration award against you, you must cut down on investment.' Does that make sense? Here is a railway investment programme which was designed to get us away from the present situation, and so to increase productivity, services, and the rest as to enable the B.T.C. to pay reasonable wages. Now we have the dilemma that if the B.T.C. does pay even the minimum considered necessary, it has to cut investment.

". . . It is not very long since an inquiry on the railway wages situation produced a rather famous report. The House will recall these words:—

"'The nation has provided by statute that there shall be a nationalised system of railway transport which must be regarded as a public utility of the first importance. Having willed the end, the nation must will the means. This implies that employees of such a national service should receive a fair and adequate wage, and that, in broad terms, the railwaymen should be in no worse case than their colleagues in a comparable industry.'

"That report was accepted by the Government. Does it still stand by it? We need an answer—and the railwaymen certainly need an answer."

The Paymaster-General, Mr. Reginald Maudling, replying to this point, said:—"As controllers of the volume of money, we have, first of all, a direct responsibility in the case of railways, an indirect but equally effective responsibility in the case of industry generally. In the case of the railways . . . we cannot increase the amount of money flowing from the taxpayer to meet the railway operating deficit. In so far as, in accordance with negotiations or arbitration decisions, they find themselves paying more wages, they will have to find that cost somewhere within their own resources. That is, I think, a quite fair statement of principle.

Appeal to the Government

Mr. Alfred Robens (Blyth—Lab.) asked the Government on November 12 for more enlightenment on its attitude to railway wages, and paid tribute to the late Mr. James Campbell as "a very fine gentleman," who had said on the eve of going to Russia:—"What will happen when the Railway Staff Joint Council meets again? Is the B.T.C. in a position to give a reply based solely on the merits of trade union submissions and unbiased by outside pressure? . . . The destruction of faith in negotiating machinery would harm the nation every bit as much as the employers and the trade unions. It is only because the N.U.R. and the B.T.C., for example, could sit round a table and discuss their problems with mutual trust that we can point with pride to 31 years without an official strike."

Mr. Robens commented:—"Is this record of 31 years of industrial peace—or of no official strikes—between the N.U.R. and the B.T.C. to be continued, or will the action of the Government force, if not a strike, then working to rule, going slow and working to the handbook, which is about the slowest thing that can be done on a railway? It is done quite legitimately; the rules are laid down for the observance of the safety of the travelling public. What a stupid thing it would be for all this to happen."

Mr. J. Campbell

Mr. R. A. Butler, Home Secretary & Lord Privy Seal, said that reference had been made to one of the leaders of our national life, namely Mr. Jim Campbell, who, together with Mr. Hollywood, had been killed in an accident in a far-off country. He immediately took up the reference by Mr. Robens to these leaders of the trade union movement and expressed sympathy with their relatives. [Hon. Members: "Hear! hear!"] He did not want to go with that, because he wanted to say that Mr. Campbell was a respected figure in the trade union movement. It was no part of Government policy to seek to destroy the industrial relations or the collective bargaining which he did so much to foster. Nor did they intend to destroy the arbitration machinery. He himself would not support any such policy.

Questions in Parliament

B.T.C. Interest Rates

Mr. David Jones (The Hartlepools—Lab.) asked the Minister of Transport & Civil Aviation on November 13 by what amount the interest payable by the B.T.C. on the deficit will increase in the present financial year in consequence of the increase in the Bank Rate.

Mr. Harold Watkinson, in a written reply: Payment of interest in the current financial year will not be affected.

B.T.C. Purchasing Procedure

Mr. E. Davies (Enfield E.—Lab.) asked the Minister of Transport & Civil Aviation on November 13 what steps had been taken to give effect to the recommendations contained in the Report on the Purchasing Procedure of the British Transport Commission, Command Paper No. 262.

Mr. David Jones (The Hartlepools—Lab.) also asked how many of the recommendations of the Sir Harold Howitt report had been put into effect by the B.T.C.; and when it was expected it would be able to operate the remaining recommendations.

Mr. Harold Watkinson, in a written reply to both questions: The B.T.C. new directive on purchasing procedure, the principles of which were endorsed by Sir Harold Howitt, is already being followed by all concerned. The other steps to give effect to the recommendations of the report are fully described by the Chairman of the B.T.C. in a letter to me of September 16 published with the report. The only outstanding recommendation therefore concerns the policy and organisation for production in the railway workshops; this is still being studied by the Commission.

Expenditure on Railway Capital Works

Mr. D. Jones (The Hartlepools—Lab.) asked the Minister of Transport & Civil Aviation on November 13 what amount it was anticipated would be spent by the B.T.C. in 1958 in connection with its modernisation programme, and what amount on other capital works, excluding the modernisation programme.

Mr. Harold Watkinson, in a written reply: In 1958 the B.T.C. proposes to invest in railways about £145 million, and in its other activities about £25 million. It is not possible to distinguish between replacements and modernisation since most capital investment on the railways includes some modernisation.

Borrowing for Modernisation

Mr. Ernest Davies (Enfield E.—Lab.) asked the Minister of Transport & Civil Aviation on November 13 by how much it was estimated the interest charge on modernisation borrowing, as given in Command Paper No. 9880, will increase as a result of higher interest rates and the increase in cost of the programme from £1,200 milion to £1,500 million; by how much revenue will fall short of estimates as a result of these higher charges and the restriction on investment; and what consequent steps the B.T.C. is taking to ensure fulfilment of the estimate that it will be in balance by 1961 or 1962.

Mr. Harold Watkinson, in a written answer: It is not possible to forecast future interest rates. The B.T.C. has reviewed the estimates in the Command Paper in the light of the best information at present available on all the factors affecting revenue—including the increased cost of the modernisation programme and the restriction on capital investment. It sees no reason to depart from the conclusion in the Command Paper.

Contracts and Tenders

Charles Roberts and Co. Ltd., order for tank wagons

Charles Roberts & Co. Ltd., Horbury Junction, Wakefield, has received an order from Fisons Limited, Felixstowe, for 45 tank wagons, with stainless steel barrels, for the conveyance of nitrogen liquor, and two tank wagons with pressure barrels, for the conveyance of liquefied ammonia. The total value of the orders is some £245,000.

Crushing, screening and loading plant has been ordered from Goodwin Barsby & Co. Ltd., Leicester, and a fleet of five 4½-cu. yd. dumpers from Aveling Barford Limited, Grantham, to meet the ballast requirements of the Nigerian Railways Corporation, Lagos, following the discovery of a dolerite deposit in a remote part of Nigeria.

The British Transport Commission, South Wales Docks, has placed the following contracts:—

G. Tate & Son Ltd.: replacement of north jetty, Penarth

Walsall Electrical Co. Ltd.: supply and delivery of 10 crane plug boxes, bulk discharging berth, Barry

Andrew Scott (Civil Engineers) Limited: repairs to north pier, Port Talbot.

British Railways, Eastern Region, have placed the following contracts:—

Wm. Proctor & Sons Ltd., Sheffield, 2: provision of additional roof lighting and ventilation to carriage building and trimming shops at Doncaster Works

W. & C. French Limited, Buckhurst Hill, Essex: construction of new steel sheet pile quay wall, and ancillary works at Town Quay, Harwich

Lorne, Stewart (Heating) Limited, Wembley, Middlesex: reconstruction of engine shed, ancillary buildings, and sand drier at South Lynn Motive Power Depot

A. Cameron Limited, North Cheam, Sutton, Surrey: cleaning and painting of ironwork and steelwork to bridges Nos. 7, 8, 9, 10, 12 and 13, between Liverpool Street and Bethnal Green.

British Railways, North Eastern Region, have placed the following contracts:—

Oxhycarbon Co. Ltd., Croydon: oxygen profile cutting machine, Darlington Locomotive Works

Mathew Bros., Wallington, Surrey: "Matbro" mantis tractor with attachments

Butler Machine Tool Co. Ltd., Halifax: axlebox shop planing machine, Darlington Locomotive Works

G. Cohen Sons & Co. Ltd., London: two 15-cwt. mobile self-propelled cranes

Tarslag Limited, Stockton on Tees: supply and delivery of pre-stressed concrete beams and concrete units, Stockton Goods Depot

Kitchen & Wade Limited, Halifax: radial drilling, boring and tapping machine, Simonside Wagon Depot

Iredale Bros. Ltd., Brighouse: provision of W.C.'s, Manningham, Bradford.

British Railways, Scottish Region, have placed the following contracts:—

A. & P. Steven Limited, Glasgow: installation of two new lifts, 87 Union Street, Glasgow

James Laidlaw & Sons Ltd., Rutherglen: new store at Barrack Street Depot, Glasgow

James Miller & Partners Ltd., Edinburgh: earthworks and water supply, new marshalling yard, Millerhill, Edinburgh

P. & W. MacLellan Limited, Glasgow: renewal of underbridge between Stirling and Cambus

Fleming Bros. (Structural Engineers) Ltd., Glasgow: steelwork, and roofing, new goods shed, Sighthill, Glasgow.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follows:—

From Costa Rica:

2 diesel-hydraulic or diesel-electric locomotives for shunting services and for passenger and goods trains. Track gauge 1·067 mm. (Sic). Type B or B-B, minimum weight in service 25 *tonnes;* maximum weight in service 35 *tonnes;* maximum speed in shunting services, 19 m.p.h.; maximum speed in passenger or goods service, 37 m.p.h.; automatic couplings of the Sharon or Henricot type.

The issuing authority is the Pacific Electric Railway (Ferrocarril Electrico al Pacifico). The tender No. is 185. Bids should be submitted in a sealed envelope marked "Licitacion No. 185—Provision de locomotoras diesel hidraulicas o diesel electricas" to La Proveeduria del Ferrocarril Electrico al Pacifico, San José. The closing date is December 3, 1957. The Board of Trade reference is ESB/27806/57.

From Korea:

45,000 track bolts, complete with nuts, 1 in. × 5½ in., ¾ in. × 3¾ in., 1 in. × 5½ in.

110,000 spring washers, $\frac{7}{8}$ in. × 1 in. dia.

1,115,500 rail anchors

479,400 base plates

1,700 pairs of insulated joints, 24 in. long, complete with bolts, nuts, and four sets of fibres.

The issuing authority and address to which bids should be sent is the Office of Supply, Government of the Republic of Korea, Seoul, Korea. The tender No. is 89-33-240-6-70204. The closing date is December 10, 1957. The Board of Trade reference is ESB/27195/57/ICA.

From India:

1,400 split lock stretchers, non-insulated to part No. 444324 of drg. No. 44432G

300 split lock stretchers N.I. for S.L.M. to part No. 446904 of drg. No. 44690F

2,600 bearing assembly (thrust journal) to part No. 44403 of drg. No. 44400D

2,600 rocking shaft straight arm, 7½ in. to part No. 443956 of drg. No. 44395

1,800 bar driving rod 7 ft. non-insulated to part No. 446944 of drg. No. 44694H

1,800 bar driving rod, 4 ft. 10 in. non-insulated to part No. 446947 of drg. No. 44694 H

1,800 lock driving rod, 6 ft. 4 in. non-insulated to part No. 446948 of drg. No. 44694H

1,500 detector rod non-insulated 1 ft. 3 in. to part No. 519593, of drg. No. 51959 C

1,500 detector rod 5 ft. (off set joint) N.I. to part No. 519369 of drg. No. 51936 F

1,500 detector stretcher complete N.I. to part No. 519535 of drg. No. 51953 E

The issuing authority is the Director General of Supplies and Disposals. The tender No. is WP2/24135-H/A. Bids should be sent to the Director General of Supplies and Disposals, Sahjahan Road, New Delhi. The closing date is December 4, 1957. The Board of Trade reference is ESB/27185/57.

From Portuguese East Africa:

4 fireboxes complete for locomotives S.700.

The issuing authority is the Ports, Railways & Transport Department, Lourenço Marques. The tender No. is 214/57. The closing date is December 16, 1957. A provisional deposit of Esc. 65,000 must be made. Local representation is essential. The Board of Trade reference is ESB/27140/57.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

The Director General, India Store Department, Government Buildings, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of rough turned axles for locomotives. See Official Notices on page 612.

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the closing date of the call from Pakistan for components for the fabrication of 700 broad gauge wagons reported on page 376 of our September 27 issue, has been postponed to December 9, 1957.

WAGE DEMANDS IN WESTERN GERMANY.—Discussions between representatives of engineering trade unions and employers in Hesse, Western Germany, on a 10 per cent wage increase and a shorter working week, are reported to have broken down when the employers refused to consider the claims. The employers seem to be relying on Government support. Dr. Adenauer, Chancellor of the Federal Republic, stated recently that wage agreements which endangered the national economy would not be allowed.

DAY EXCURSION FROM THE NORTH EAST TO HOLLAND.—After the success of the "Day in Holland" excursion this year, British Railways, North Eastern Region, are considering a similar venture next May. A special train is planned to start at Newcastle-upon-Tyne, calling at the principal places en route to Harwich and parties from towns not on the route travel by ordinary trains to connect with the excursion at convenient stops. Each passenger has a reserved seat in the train and cabin accommodation for the crossing between Harwich and the Hook. The full-day tour in Holland includes a short motorcoach tour of Amsterdam and a canal tour by motor launch.

Notes and News

Travel Advice at Paddington.—A "rail travel adviser" was introduced at Paddington Station on November 18 by the Western Region of British Railways. She is Miss Frances Stride, who, in a distinctive chocolate-coloured uniform, mingles with passengers on the station and gives advice and assistance to those who have travel problems. Miss Stride has completed a 12-weeks' course of study, which included an extensive study of Western Region timetables, principal changing points, seat reservation arrangements, and refreshment and sleeping car services. It also included methods of dealing with queries regarding the sending of luggage in advance and on the recovery of lost property. Should enquiry be made concerning other railway facilities such as cheap fares, excursions, party outings, circular tours, camping coaches, Channel Islands and Irish bookings, she is also in a position to answer promptly. She is the third Rail Travel Adviser on British Railways; the Western Region has made similar appointments at Birmingham Snow Hill and Cardiff General, where they have proved an unqualified success.

The newly-appointed Rail Travel Adviser, Miss F. Stride, giving information to a passenger at Paddington

Rhodesia Railways Diamond Jubilee.—To commemorate the sixtieth anniversary, on November 4, of the official opening of the railway throughout between Cape Town and Bulawayo, which coincided with the sixtieth anniversary of the municipality (new city) of Bulawayo, a special train was run to Bulawayo station. This consisted of 60-year-old passenger coach hauled by one of the few surviving "7th" class Rhodesia Railways locomotives (built by the North British Locomotive Co. Ltd. in 1904). "Passengers" of the train wore uniforms and costumes of 1897; among them were "Sir Alfred Milner" who brought a message from Queen Victoria. Speeches to mark the occasion were made by the Minister of Transport, for the Federation of Rhodesia & Nyasaland, Mr. W. H. Eastwood, the Mayor of Bulawayo, Councillor J. S. McNeille, and the General Manager, Rhodesia Railways, Lt.-Colonel H. B. Everard. The Federal Prime Minister, Sir Roy Welensky, who has always been closely associated with the Rhodesia Railways was also present. The celebrations included a display of locomotives and rolling stock (see page 588).

Sir Roy Welensky with Mr. W. H. Eastwood (right) and Lt.-Colonel H. B. Everard at the Rhodesia Railways jubilee celebrations

Accident in France.—A French local diesel train came into collision with a steam-hauled freight train at Chantonnay in the Vendée, in the Western Region of the French National Railways, on November 16. The two-coach diesel train was accelerating on the single line out of Chantonnay station and was rounding a bend in the track when the driver saw the freight train coming towards him. The brakes could not be applied in time to prevent the collision, and 29 people were killed and 21 injured. The driver of the diesel train and a member of the Chantonnay station staff have been detained in custody.

B.U.T. Change of Address.—The address of British United Traction Limited is now 96, Piccadilly, London, W.1. The telephone number is Grosvenor 7121.

New British Railway Company Formed.—A new railway company, known as the Lyon Street Railway Company, with a nominal capital of £200 in £1 shares, has been formed to acquire and manage a private railway at Hebburn, Co. Durham. The company is controlled jointly by Hawthorn, Leslie & Co. Ltd. and Vickers Limited.

Firemen on Diesel Locomotives.—The Kellock Commission, which was appointed early in the year to enquire into Canadian Pacific Railway proposals to dispense with the services of firemen on diesel locomotives engaged in certain duties, has ended its public hearings. It will make a report to the Federal Government, probably by the end of the year.

Underground Timetable Republished.—London Transport brought out on November 18 its first published timetable of London Underground services to be issued since before the war. The timetable includes in its 102 pages the times of first and last trains from all the 277 Underground stations and the intervals between trains at all times of the day. The guide enables the time taken for any Underground journey to be seen at a glance. Times of every train from outer Underground terminals are listed where the services from these points run at more than 15-min. intervals. The complete timetable for the Metropolitan Line from Aldgate to Aylesbury is included. It includes a map, an indication of every station which has a car park, with its capacity, and other general information. The time-

table costs 1s. and is obtainable from London Transport enquiry offices at 55, Broadway and Piccadilly Circus, and at most Underground stations.

Channel Tunnel Developments.—Addressing a meeting of the Channel Tunnel Committee at the House of Commons on November 18, M. Georges Galliene, President of the Union Routière de France proposed that a dual carriageway for road traffic should be included in the plan now under examination for a railway tunnel. M. Galliene is reported to have stated that both British and French railways were hostile to this proposal, but it had the support of the Suez Canal Company.

Shell-Mex & B.P. Limited Film on Forming Metals.—The preview of the Shell-Mex & B.P. Limited film, "Forming of Metals," was held at Shell-Mex House, London, on November 18. The film was photographed at works throughout Britain, and deals with all the main forming processes. Microphotographs and models are used to describe some of the processes and to demonstrate how the metal is given particular physical properties. Of particular interest is the press forging of wagon wheels at the Sheffield works of Steel, Peech & Tozer Limited. This process has been speeded up by linking many operations into a continuous sequence. The film, which is in colour and runs for 28 mins., was directed by Peter de Normanville and photographed by Sidney Beadle and Eric Chamberlain.

L.M.R. (London) Dramatic Society.—On November 15 and 16, the Euston Players successfully presented at the Rudolf Steiner Theatre, Baker Street, N.W.1, J. B. Fagan's comedy, "And So To Bed," an adventure with Pepys. This comedy is set in the Restoration period, the central characters being Mr. and Mrs. Pepys, and King Charles II and his lady friends. A really outstanding performance as Samuel Pepys was given by John Boddington, who was more than adequately supported by Renee Hudd as Mrs. Pepys, and Margaret Kirby as the notorious Mrs. Knight. Arthur Lloyd, who has had a long career on the amateur stage, excellently portrayed King Charles II, the gay monarch with the roving eye; and John Ahern, another well-known Euston player, was equally excellent in the part of Pelham Humfrey. Richard Coleby, Harold Holah, Joyce Cordery, and Rosalind Adkins ably took the parts of Pelling (The Potticary), Caesar, Mrs. Pierce, and Mrs. Knepp, respectively. Others making up the cast included Maureen Smith as Sue, Michael Ausden as boy to Pepys, Doris Hillebrand as Doll (a Blackamoor), Miriam Pine as Julia, Vivienne Gough at Lettice, and William Gennor as Prodgers (Groom of the Bedchamber). The play was beautifully dressed and produced by Beckie Pass, who has been associated with the L.M.R. (London) Dramatic Society for many years, both as actress and producer.

Faraday Lecture on Electrification of British Railways.—Mr. G. H. Fletcher, formerly Chief Engineer & Manager of the Sheffield traction works of the Metropolitan-Vickers Electrical Co. Ltd., and now a consultant engineer to the General Electric Co. Ltd., will give the Faraday Lecture this year on the subject "Electrification of British Railways." This lecture is sponsored annually by the Institution of Electrical Engineers to bring to the general public some knowledge of developments in the electrical field. Dates and places where the lecture will be given are as follow:—November 26, 1957, City Hall, Newcastle; December 4, City Hall, Sheffield; December 6, Town Hall, Birmingham; January 15, 1958, Temple Speech Room, Rugby; January 23, Sophia Gardens Pavilion, Cardiff; February 10, Guild Hall, Southampton; February 12, Central Hall, Westminster; February 18, Victoria Hall, Hanley; February 20, Albert Hall, Nottingham; March 4, Free Trade Hall, Manchester; March 6, Philharmonic Hall, Liverpool; March 27, Hall of Royal College of Science & Technology, Glasgow. Some additional lectures are being given in certain centres for the senior students of technical colleges and grammar schools.

Jewel Theft from Railway Station.—A suitcase containing jewellery valued at £10,000 was stolen from Kidderminster railway station on October 31. The owner, stated to be a jewellery traveller, left the case on the platform while he took other cases to the cloakroom. It had gone when he returned. The police are conducting investigations.

Pollard Bearings in Canada.—A large plant is under construction at Oakville, Ontario, Canada, for the manufacture of Pollard bearings. The company will trade as Canadian Pollard Bearings Limited. Pollard Bearings are stated to have already made deep inroads in the Canadian market with a nation-wide sales organisation that has tripled sales annually since its inception in 1949.

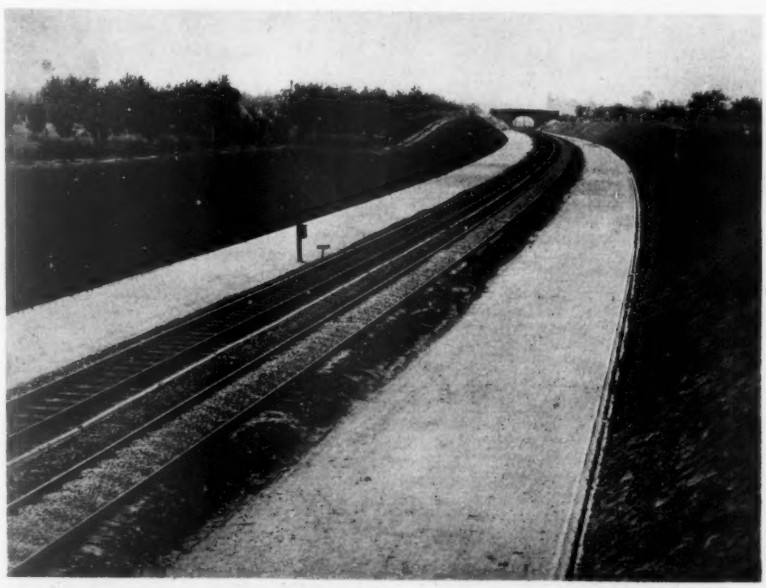
Kent Coast Electrification Scheme.—A considerable amount of work has now been completed between Rainham and Newington, Southern Region, on the widening of the line to provide two new loop lines, each about 2¼ miles long, so that fast trains can by-pass the slower trains. The accompanying illustration shows a completed section of the widening prior to the laying of the new up and down passing loops. The arched bridge in the background was demolished by explosives on November 10 (see the Scrap Heap, page 587) and will be replaced by a new bridge spanning three tracks.

Tape Recorder Exhibition.—An exhibition of tape recorders, organised by the Hatherley Photographic Co. Ltd., of Uxbridge Road, London, W.12, was held at the Kingsley Hotel, London, on November 19-21. A wide range of models from various manufacturers was shown and demonstrated. Some of these are applicable to office use and to the recording of station announcements.

Pay Increase Sought by L.T.E. Railwaymen.—Four unions representing about 3,900 men in the Underground railway workshops of London Transport asked at a meeting with the London Transport Executive last Tuesday for a substantial increase in pay, a 40-hr. week, and three weeks' annual holiday with pay. The London Transport representatives undertook to consider the claims, and will give their reply later.

New French National Railways Ferry.—A new motorcar ferry, the *Compiegne*, is to be brought into service by the French National Railways on the Dover-Calais route at the end of May, 1958. The ship will have a tonnage of 3,400 and be capable of carrying 164 motorcars.

B.T.C. Film Wins Belgian National Prize.—The British Transport Commission film, "The England of Elizabeth," has been awarded the Belgian national prize as the most informative travel film exhibited at the seventh international tourist film week in Brussels. The award was given by the Belgian Ministry of Education. The film features buildings, art treasures, costumes, and customs of the first Elizabethan era, which can still be seen today by tourists and holidaymakers in Britain. Music for the film was specially composed by Ralph Vaughan Williams and directed by Muir Mathieson. The commentary, written by John Moore, is spoken by Alec Clunes.



Section of the Kent Coast main line between Rainham and Newington, Southern Region, after completion of earthworks and before the laying of passing loops

Forthcoming Meetings

November 25 (*Mon.*).—Railway Correspondence & Travel Society, Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. Paper on "The Midland as I knew it, 1904-1922," illustrated by lantern slides, by Mr. V. Stewart-Haram.

November 26 (*Tue.*).—Railway Service Christian Union, at the Headquarters of the British Transport Commission, 222, Marylebone Road, N.W.1, at 6.15 p.m. Paper on "To the clouds by train," illustrated by lantern slides, by Mr. Cecil J. Allen, Mr. J. Taylor Thompson will be in the Chair.

November 26 (*Tue*).—Institute of Transport, Metropolitan Graduate & Student Society, at 80, Portland Place, W.1, at 6.15 p.m. Annual general meeting followed by a paper on "The design of multiple unit rolling stock for suburban service, from the passenger's point of view," by Mr. J. G. Bruce.

November 26 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Examples of railway colour photography, by Messrs. R. C. Anthony, G. Shipman, and E. N. C. Haywood.

November 26 (*Tue.*).—Institute of Transport, South Eastern Group, at the Royal Star Hotel, Maidstone, at 7.15 p.m. Paper on "Modernisation and electrification in the South East of England," by Mr. J. K. Blue.

November 27 (*Wed.*).—Institute of Transport, visual aids meeting, at 80, Portland Place, London, W.1, at 6.15 p.m. Instructional film.

November 27 (*Wed.*).—British Railways (Southern Region) Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1, at 6 p.m. Paper on "Old London bridges," illustrated by lantern slides, by Mr. R. A. Manthei, Regional Director, Associated Industrial Consultants Limited.

November 28 (*Thu.*).—British Railways (Western Region) London Lecture & Debating Society, at the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Debate with Oxford University Railway Society. "That the proposed elimination of steam locomotives on British Railways is a national disaster."

November 29 (*Fri.*).—Institution of Railway Signal Engineers, Bristol Section, at Westinghouse Brake & Signal Company's works, Chippenham, at 5.45 p.m. Paper on "The work of a District Chief Installer," by Mr. W. H. Tillin.

November 30 (*Sat.*).—Railway Correspondence & Travel Society, Sussex & Kent Branch, at the Railway Hotel, Brighton, at 6.30 for 7 p.m. Paper on "The suburban services of the L.C. & D.R.," by Mr. O. J. Morris.

December 2 (*Mon.*).—Institute of Transport, Metropolitan Section, at 80, Portland Place, London, W.1, at 5.30 for 6.0 p.m. Annual general meeting followed by a paper on "Underground Railways in Northern Europe," by Mr. F. G. Maxwell.

December 3 (*Tue.*).—Permanent Way Institution, Leeds and Bradford Section, in the British Railway Social & Recreation Club, Ellis Court, Leeds City North Station, at 7 p.m. Annual general meeting, followed by a paper on "A life on the permanent way," illustrated by lantern slides, by Mr. V. Lockwood.

December 3 (*Tue.*).—South Wales and Monmouhshire Railways and Docks Lecture and Debating Society, Cardiff Section, in the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. Paper on "Modern signalling and rail telecommunications," illustrated by lantern slides, by Mr. A. W. Woodbridge, Signal Engineer, Western Region, Reading.

December 6 (*Fri.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Paper on "The Kent & East Sussex Railway," by Mr. R. H. Roberts.

December 3 (*Tue.*).—Railway Correspondence & Travel Society, Sheffield Branch, at the Livesey Clegg House, Union Street, Sheffield, at 7 p.m. Paper on 'The Reid Atlantics of the N.B.R.," by Mr. W. Herrigan.

December 4 (*Wed.*).—Railway Students' Association, at the London Transport (South Kensington) Club, Pelham Street, S.W.7, at 6.15 for 7 p.m. Annual dinner and dance.

December 5 (*Thu.*).—The Railway Correspondence and Travel Society, West Midlands Branch, at the Arden Hotel, New Street, Birmingham, at 7.30 p.m. Film show including several new S.N.C.F. films.

December 6 (*Fri.*).—The Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1., at 6.45 p.m. Internal Combustion Engine Group and Discussion: "Are crankshaft torsional vibration problems things of the past?"

Railway Stock Market

A widespread rally developed in stock markets largely because sentiment was assisted by the recovery on Wall Street, where there was response to the reduction in the New York bank rate. The latter was due to the belief that the inflation danger has receded in the U.S.A. This does not mean that a cut in the British bank rate will necessarily follow, though there is some talk in the City that a decrease from 7 per cent to 6½ per cent may come before the end of the year. It is realised that it may be well into next year before the bank rate comes down to its previous level of 5 per cent, and that for the next six months it may be wise not to look for a lower rate than 6 per cent. A great deal will, of course, depend on the extent to which the battle against inflation progresses.

The main feature among foreign rails has been a reaction in Antofagasta because of some disappointment with the unchanged 4 per cent dividend, though no more than this was generally expected. Compared with a week ago the ordinary stock has come back from 26 to 23½, and the preference stock from 40 to 38. United of Havana second income stock remained at 8 and the consolidated stock was 2½.

San Paulo Railway 3s. units have changed hands around 2s. 3d., while Taltal Railway shares were quoted at 15s. 6d. Chilean Northern debentures were 37½, Costa Rica 6½ per cent first debentures 74, and Brazil Railway bonds 4½.

International of Central America shares were $18½ and the preferred stock $127. Mexican Central debentures have strengthened from 65¾ to 66.

Canadian Pacifics strengthened with the better trend on Wall Street and were $50¼, compared with $50 a week ago. White Pass shares remained at $15.

Elsewhere, Nyasaland Railways shares again changed hands around 9s. 6d., while the 3½ per cent debentures were 57½ xd.

Shares of locomotive builders and engineers became firmer generally, though Beyer Peacock 5s. units remained at 7s. 9d. Westinghouse Brake, however, rose on balance from 29s. to 31s. 9d. Moreover, Associated Electrical rose on balance from 50s. 4½d. to 52s., English Electric from 50s. 1½d. to 51s. 3d., and General Electric from 40s. 1½d. to 41s. 3d.

Charles Roberts 5s. shares firmed up from 7s. 9d. to 8s., G. D. Peters shares remained firmly held and quoted at 26s. 3d., while Gloucester Wagon were 14s. 3d. and Wagon Repairs 5s. shares 11s. 9d. Hurst Nelson at 27s. were little changed at Glasgow, North British Locomotive 12s., compared with 11s. 7½d. a week ago, and Birmingham Wagon 14s. 9d., compared with 15s.

Pressed Steel 5s. shares rallied to 13s. 9d. and the 10s. shares of the Dowty Group to 30s. 9d., while British Aluminium improved to 42s. and, reflecting general expectations that the dividend will be maintained at 10 per cent, British Oxygen have improved to 33s. 7½d. British Ropes 2s. 6d. shares showed firmness at 6s. 7½d., and in other directions, British Timken have been firmer at 48s. 9d. Tube Investments at 53s. 9d. xd were easier but the chairman's annual statement indicates that, although for the present financial results must reflect general conditions, the group have not yet derived full benefits from their progressive policy. T. W. Ward shares rallied well to 68s. 6d., and Vickers were better at 31s. 9d. Crompton Parkinson 5s. shares at 15s. 3d. showed firmness, having remained under the influence of the good impression created by the past year's results. A.C.V. shares changed hands around 39s. 6d. and Leyland Motors were 43s. 6d. Steel shares changed hands at slightly higher prices in the hope that the forthcoming dividend decisions may show a number of small increases. Colvilles were better at 26s. 3d. on higher dividend hopes, and John Summers active around 25s. 6d. in response to dividend estimates which range up to 14 per cent.

OFFICIAL NOTICES

REQUIRED for the Southern Railway of Peru Ltd., LOCOMOTIVE CARRIAGE AND WAGON DRAUGHTSMAN. Must have served a full general apprenticeship in an engineering workshop (preferably railway) and have had at least five years' subsequent drawing office experience. Age 30/35 years. Salary £1,200/£1,400 per annum plus approximately 20 per cent. cost of living allowance. Apply in writing: The Peruvian Transport Purchasing Co. Ltd., Rex House, 38 King William Street, London, E.C.4.

FOR SALE OR HIRE, Hudswell Clarke 0-6-0 standard gauge STEAM LOCOMOTIVE, in good condition.—Apply Eagre Construction Co. Ltd., Scunthorpe, Lincolnshire. 'Phone 4513 (7 lines).

THE Director General of India Store Department, Government Buildings, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of 490 AXLES Rough Turned for Locos. and Tenders. Forms of tender may be obtained from the above address on or after 22nd November, 1957, at a fee of 10s. which is not returnable. If payment is made by cheque, it should please be made payable to "High Commissioner for India." Tenders are to be delivered by 2 p.m. on Monday, 6th January, 1958. Please quote Reference No. 86/57.DB/RLY.2.

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